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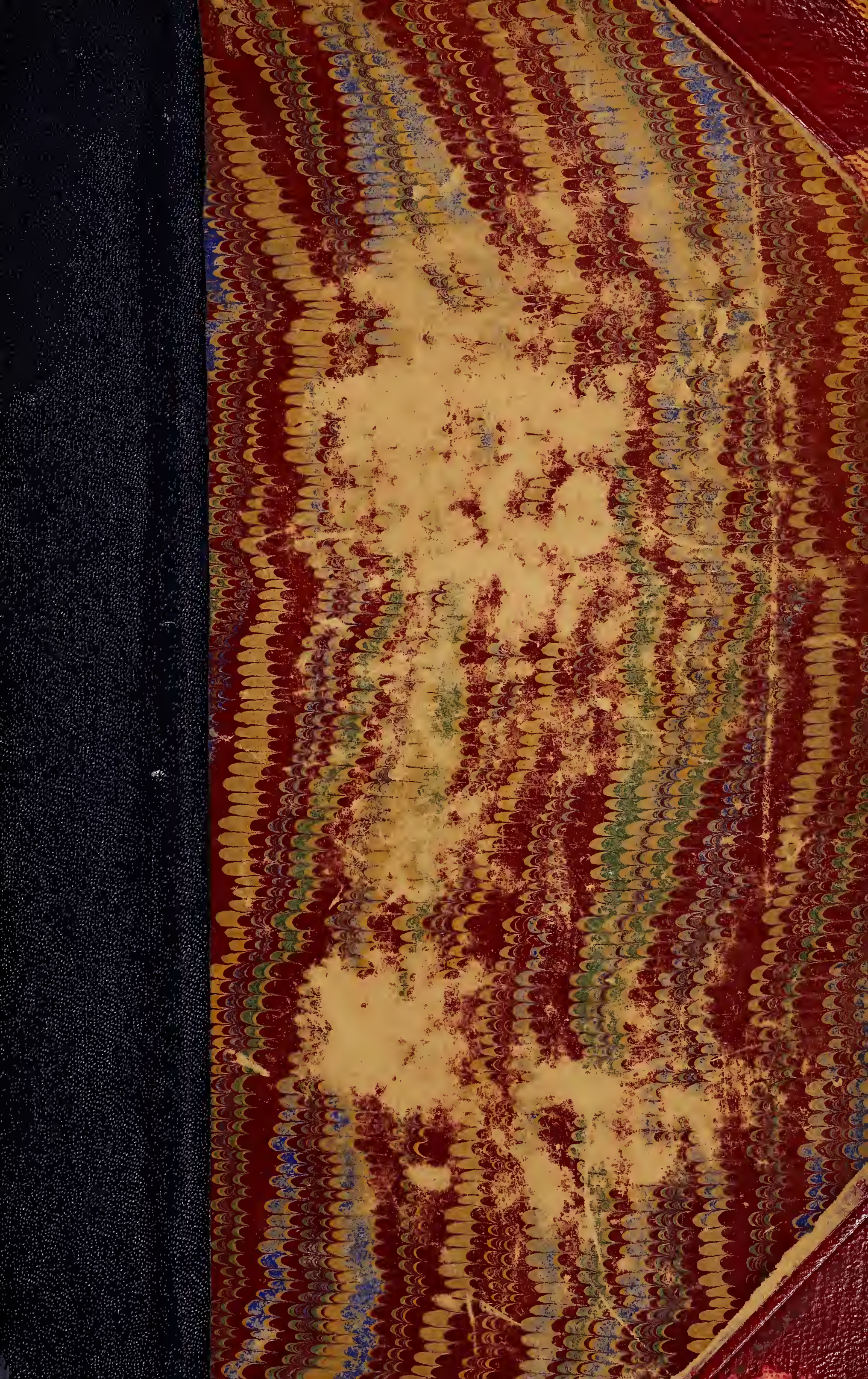

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U. S. DEPARTMENT OF AGRICULTURE,
FOREST SERVICE—BULLETIN 74.
GIFFORD PINCHOT, Forester.

FOREST PRODUCTS OF THE UNITED STATES:

1905.

BY

R. S. KELLOGG, Forest Inspector,
AND
H. M. HALE, Forest Assistant.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1907.

LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Forest Service,
Washington, D. C., January 11, 1907.

Sir: I have the honor to transmit herewith a manuscript entitled "Forest Products of the United States: 1905," by R. S. Kellogg, Forest Inspector, and H. M. Hale, Forest Assistant, Forest Service, and to recommend its publication as Bulletin 74 of the Forest Service.

The three diagrams which accompany the manuscript are necessary for a proper understanding of the subject.

Respectfully,

Gifford Pinchot, *Forester.*

Hon. James Wilson,
Secretary of Agriculture.

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FOREST PRODUCTS OF THE UNITED STATES, 1905.

INTRODUCTION.

By R. S. Kellogg.

Forest Inspector.

The annual yield of the forests of the United States reaches huge proportions, and familiar as all are with the use of wood for every purpose and in every industry, it is only when the attempt is made properly to estimate the various items that there is a full realization of the important place the forests fill in the national economy. A rough estimate of the quantity and value of the present yearly output of the forests is given below.

Annual output of forest products.

[Value estimated at point of production.]

		Quantity.	Value.
Lumber	feet B. M.	35,000,000,000	$500,000,000
Firewood	cords	100,000,000	350,000,000
Shingles and lath			32,000,000
Hewed cross-ties	number	70,000,000	30,000,000
Cooperage stock			25,000,000
Turpentine and rosin			20,000,000
Pulp wood	cords	3,000,000	15,000,000
Timber exported (unsawed)			10,000,000
Telephone and telegraph poles	number	3,500,000	8,000,000
Round mine timbers	cubic feet	170,000,000	7,500,000
Tanbark	cords	1,200,000	6,000,000
Maple sugar and sirup			2,500,000
Wood used for veneers	feet B. M.	300,000,000	2,000,000
Wood used for distillation	cords	700,000	2,000,000
Posts, piles, and other products			10,000,000
Total			1,020,000,000

These figures are based upon reports to the Census and Forest Service; but data have never been collected on which to base anything more than an approximate statement. It is certain, however, that the figures are not an overestimate. The actual amounts may exceed the figures by from 10 to 25 per cent, and in the case of firewood by even more. According to an estimate made by the census in 1880, 146,000,000 cords were used at that time; but in order to be conservative and in the absence of reliable information the present annual consumption is placed at 100,000,000 cords.

The total quantity of wood which it was necessary to cut in order to obtain the products listed in the table was probably about 20 billion cubic feet. On the whole it is probable that the total output of forest products for the country is approaching, if it has not already reached, its maximum. Rapid as has been the increase in population, the increase in lumber consumption has been still more rapid. In round numbers, the lumber cut in 1880 was 18 billion board feet, in 1890 24 billion feet, and in 1900 35 billion feet. The increase in population from 1880 to 1900 was 52 per cent, but the increase in lumber cut was 94 per cent.

The detailed statements upon lumber cut, cross-ties, tight cooperage stock, tanbark, and wood used for mine timbers, pulp, veneer, and distillation in 1905 are given in the succeeding pages. These statements are incomplete, owing to the fact that the data were practically all secured by correspondence, and the work was entirely new both to the members of the Forest Service, who instituted it, and to the manufacturers who were asked to report their output. The results, however, are of much suggestive value, and it is planned to increase both the scope and efficiency of the statistical work in the future through cooperation with the Bureau of the Census.

THE LUMBER CUT OF THE UNITED STATES IN 1905.

By R. S. Kellogg, *Forest Inspector.*

During the past year the Forest Service has for the first time attempted to gather detailed statistics of the lumber cut of the United States. This task was undertaken in cooperation with the National Lumber Manufacturers' Association, whose members cut at least one-third of the lumber annually manufactured in the United States. The work was done almost entirely through correspondence. It was new and unfamiliar both to those who had it in charge and to the reporting manufacturers. The resulting figures, secured in spite of these handicaps, while not complete, are certainly as nearly complete as could have been expected.

The first request for statements of cut was sent to the manufacturers early in January, 1906. To those who failed to report, a second request was sent in March, and a third in April. At the annual meeting of the National Lumber Manufacturers' Association, in St. Louis, May 9, a preliminary tabulation covering 27,738,000,000 feet of lumber, cut by 11,232 firms, was presented. Subsequently other manufacturers reported, and some additional figures for delinquent firms were furnished by the North Carolina Pine Association, the Yellow Pine Manufacturers' Association, the Southern Cypress Association, the Northern Pine Manufacturers' Association, the Western Pine Manufacturers' Association, the Pacific Coast Lumber Manufacturers' Association, and the Forest, Fish, and Game Commission of New York. The information given by the two organizations last named was so full that the data for the States of Washington and New York are practically complete.

The final tabulation shows that 11,666 establishments cut 30,502,961,000 feet of lumber in 1905. According to these figures both the number of establishments and the total cut are lower than the Census showing for 1899 and for 1904. The Census figures do not cover custom mills, while a few such mills are included in the Forest Service reports. In Table 1 the statements for the three years are printed side by side. In the right-hand column of this table is given the ratio which the figures for 1905 bear to those of 1904.

TABLE 1.—*Comparison of Census figures upon the lumber cut of the United States in 1899 and 1904 with those of the Forest Service for 1905.*

Product.	Census, 1899 (23,053 establishments).	Census, 1904 (19,127 establishments).	Forest Service, 1905 (11,666 establishments).	Ratio of Service figures for 1905 to Census figures for 1904 (establishments 61.0 per cent).
	M feet.	*M feet.*	*M feet.*	*Per cent.*
Yellow pine	10,231,140	12,812,307	9,760,508	76.0
White pine	7,349,108	5,253,846	5,106,783	97.3
Douglas fir	1,725,968	2,929,534	4,319,449	147.2
Hemlock	3,285,045	3,268,787	2,804,083	85.8
Oak	3,848,363	2,902,855	1,833,769	63.2
Spruce	1,409,333	1,303,886	1,165,940	89.7
Yellow poplar	1,042,380	853,554	582,748	68.3
Cypress	492,761	749,592	753,369	100.5
Maple	605,654	587,558	608,746	103.7
All others	3,475,098	3,473,220	3,567,566	102.8
Total	33,464,850	34,135,139	30,502,961	89.0

The incompleteness of the returns for 1905 does not wholly explain the lower figures for that year, especially as to the number of establishments. The cut of 1905 in the Forest Service figures is 89.0 per cent of the Census figures for the cut of 1904, but the establishments reporting to the Service numbered but 61.0 per cent of those given in the Census. The establishments which failed to report to the Service were, however, mainly small ones. Thus, though the failure of many establishments to report has necessarily kept the given total cut below its true figure, the delinquent reports, if obtained, would not raise the given total cut proportionately.

A second fact to be borne in mind is that the actual number of establishments is on the decline. This is borne out by the Census figures of 1899 and 1904, which show a falling off of nearly 4,000 in the number of establishments during the period. During the same period the total cut increased, though not greatly. Had the number of establishments reporting to the Service in 1905 borne the same relation to those reporting to the Census in 1904 as the latter bore to those reporting to the Census in 1899, the Service figures for total cut would doubtless have shown a similar, perhaps a greater, increase. For the establishments of 1904 numbered 82.9 per cent of those of 1899, while those of 1905, as already noted, numbered only 61.0 per cent of those of 1904.

In other words, there is a clear tendency toward a reduction in number of establishments, together with a gain in individual output. Two causes account for this tendency—the end of supply is being reached in some localities, particularly with white pine stumpage in the Lake States, and the concentration of capital, as in other industries, is resulting in the consolidation of plants in fewer hands.

Not all sections of the country, and, consequently, not all woods, are proportionately represented in the figures. Many of the operators of rather small hardwood mills in the Central States and of yellow-pine mills in the Southern States did not report, and even the aid of association secretaries failed to secure data from them.

The Census gives the total value of the lumber cut of the United States in 1904 as $435,708,084. There was a marked rise in lumber prices in 1905, however; so it is safe to say that the value at the mills of the cut for that year was between $475,000,000 and $500,000,000.

SUMMARY OF PRODUCTION.

The total cut of yellow pine was probably little, if any, greater in 1905 than in 1904. The cut of white pine was certainly no greater. The cut of Douglas fir increased remarkably, because the capacity of old mills was increased and many new ones were added. The cut of fir in 1904 was also below normal, owing to unfavorable market conditions. There was probably a small decrease in hemlock. There was probably a slight decrease in the cut of spruce. The Census shows a decrease of 34 per cent in oak from 1899 to 1904, and this decrease is undoubtedly continuing. There was also some decrease in poplar, a continuation of the decrease of 18 per cent shown in the Census returns between 1899 and 1904. There was evidently an increase in cypress, maple, and the miscellaneous group, including a large number of species of minor importance, many of which are being substituted for those which are obtained with increasing difficulty.

Table 2 gives the kind and quantity of lumber cut by the 11,666 establishments from which the Forest Service received reports. Yellow pine is far in the lead, with 8,771,966,000 feet, or 28.8 per cent of the total cut; and this lead would have been increased to at least 34 per cent if full reports had been secured. White pine follows, with 4,868,020,000 feet, or 16 per cent; next Douglas fir, with 4,319,479,000 feet, or 14.2 per cent; then hemlock, with 2,804,083,000 feet, or 9.3 per cent. The relative rank of the various species is shown graphically in figure 1.

TABLE 2.—*Kind and quantity of lumber cut in the United States in 1905 by 11,666 mills.*

Kind.	M feet.	Per cent.	Kind.	M feet.	Per cent.
Yellow pine	8,771,966	28.8	Cottonwood	236,000	0.8
White pine	4,868,020	16.0	Elm	227,038	.7
Douglas fir	4,319,479	14.2	Chestnut	224,413	.7
Hemlock	2,804,083	9.3	Beech	219,000	.7
White oak	1,210,216	4.0	Ash	159,634	.5
Spruce	1,165,940	3.8	Sugar pine	123,085	.4
Western yellow pine	988,542	3.2	Western white pine	115,678	.4
Cypress	753,369	2.5	Hickory	95,803	.3
Red oak	623,553	2.0	Other kinds	294,512	1.0
Maple	608,746	2.0	Mixed	519,865	1.7
Poplar	582,748	1.8			
Redwood	411,689	1.3	Total softwoods	24,914,618	81.3
Cedar	363,900	1.2	Total hardwoods	5,588,343	18.7
Red gum	316,588	1.0			
Basswood	258,390	.9	Grand total	30,502,961	100.0
Birch	240,704	.8			

The rapid reversal which is taking place in the positions of white pine and Douglas fir is shown by the fact that in 1899 the former produced 21.5 per cent of the lumber cut and in 1905 only 16 per cent, while the latter, which produced only 5 per cent in 1899, in 1905 produced 14.2 per cent. The other species are given in order of importance. The kinds not specified include larch, tamarack, tupelo, balsam, and walnut, which are cut in relatively small amounts. The detailed figures for them will be found in Tables 28 and 29. The heading "Mixed" includes all reports which did not give the kind of timber cut or which gave it in such a way that the amounts of the several species could not be determined. It may, however, be safely assumed to be practically all hardwood. The table shows that the amount of softwood reported was 24,914,618,000 feet, or 81.3 per cent of the total cut, and that the amount of hardwood reported was 5,588,343,000 feet, or 18.7 per cent of the total cut. In 1899 the softwoods furnished about 75 per cent of the total and the hardwoods about 25 per cent. The changed ratio is due mostly to the increased cut of yellow pine and Douglas fir and the falling off in oak and poplar.

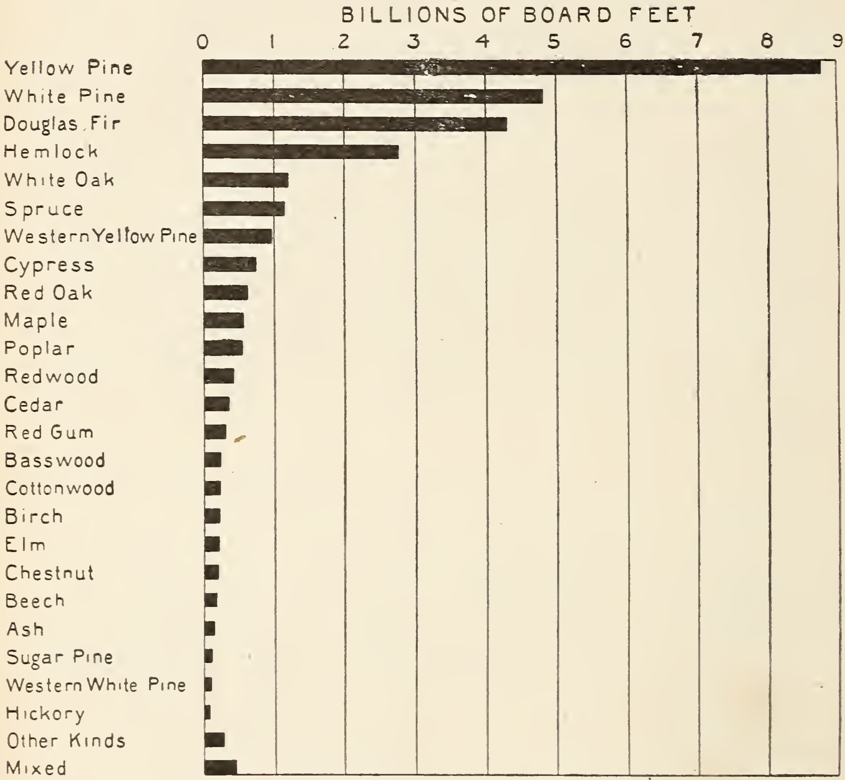

FIG. 1.—Lumber production, by species. 1905.

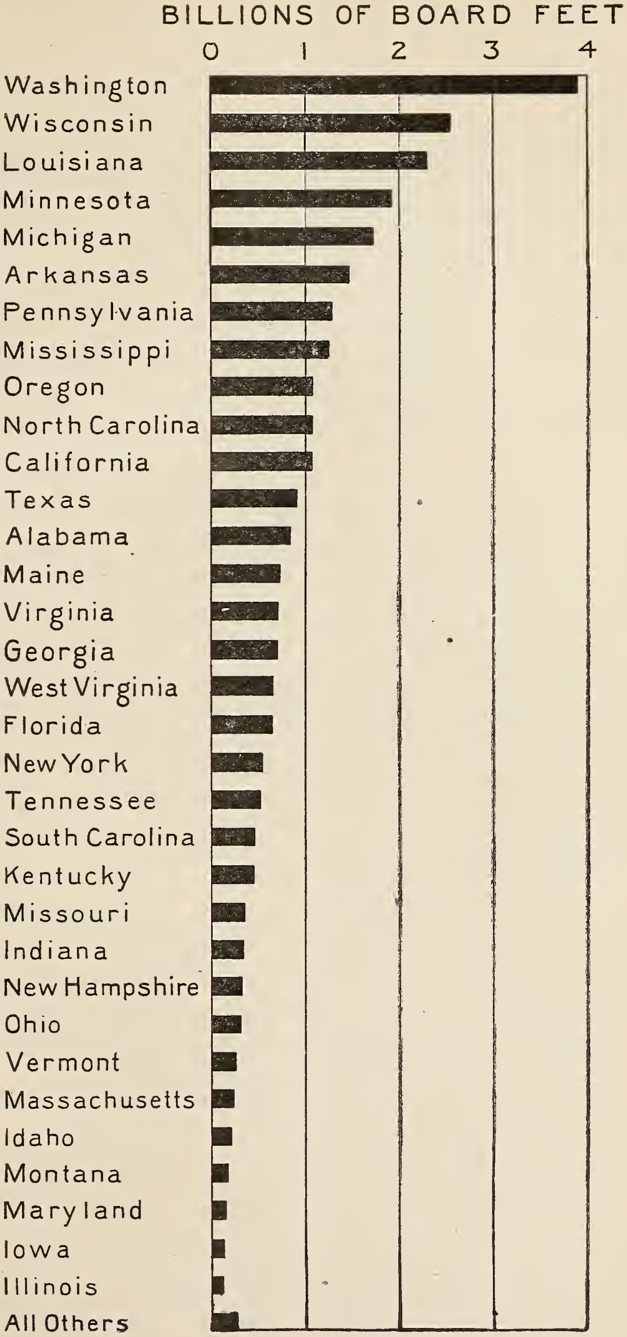

FIG. 2.—Lumber production, by States, 1905.

TABLE 3.—*States which produced over 100,000,000 feet of lumber in 1905; reports from 11,666 mills.*

State.	M feet.	Per cent.	State.	M feet.	Per cent.
Washington	3,917,166	12.8	Florida	658,007	2.2
Wisconsin	2,543,503	8.3	Tennessee	540,920	1.8
Louisiana	2,293,809	7.5	South Carolina	466,478	1.5
Minnesota	1,925,804	6.3	Kentucky	464,676	1.5
Michigan	1,719,687	5.6	Missouri	362,217	1.2
Arkansas	1,488,589	4.9	Indiana	352,362	1.2
Pennsylvania	1,397,164	4.6	New Hampshire	340,727	1.1
Mississippi	1,299,390	4.3	Ohio	331,552	1.1
Oregon	1,262,610	4.1	Vermont	266,676	.9
North Carolina	1,080,602	3.5	Massachusetts	252,804	.8
California	1,061,608	3.5	Idaho	212,725	.7
Texas	929,863	3.1	Montana	189,291	.6
Alabama	843,897	2.8	Maryland	163,749	.5
New York	750,280	2.5	Iowa	129,472	.4
Maine	745,705	2.5	Illinois	119,065	.4
Virginia	715,197	2.4	All others	292,060	.9
Georgia	712,604	2.3			
West Virginia	672,902	2.2	Total	30,502,961	100.0

Table 3 gives the 33 States which produced over 100,000,000 feet of lumber each, according to the reports received by the Forest Service. Washington leads with 3,917,166,000 feet, or 12.8 per cent of the total amount reported, followed by Wisconsin with 2,543,503,000 feet, or 8.3 per cent; next Louisiana, with 2,293,809,000 feet, or 7.5 per cent; then Minnesota, with 1,925,804,000 feet, or 6.3 per cent; and fifth Michigan, with 1,719,687,000 feet, or 5.6 per cent. From no other State does the amount reported exceed 5 per cent of the total. The 11 States which reported a cut of over 1,000,000,000 feet each, produced two-thirds of the lumber reported for the entire United States. The relative rank of the 33 States given in Table 3 is shown graphically in figure 2.

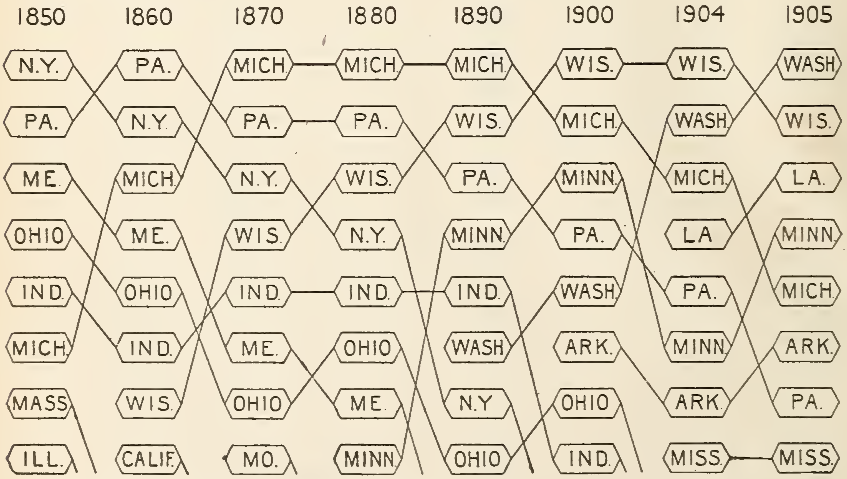

FIG. 3.—Relative rank of the eight States leading in the production of lumber since 1850.

It is interesting to note that the five leading States in the production of lumber in 1899 were Wisconsin, with 10 per cent of the total; Michigan, with 9.6 per cent; Minnesota, with 7.7 per cent; Pennsylvania, with 6.3 per cent; and Washington, with 5.3 per cent. During the past five years Washington has advanced from fifth to first place, a position it will assuredly hold for a long time.

Figure 3 gives in order of rank the eight States which have led in lumber production since 1850. From this it is seen New York occupied first place in 1850, Pennsylvania in 1860, Michigan in 1870, 1880, and 1890, Wisconsin in 1900 and 1904, and Washington in 1905. This chart is based upon Census reports, except for 1905, for which Forest Service figures are used. Previous to 1900, data are lacking concerning the quantity of lumber cut in the various States, and the rank is based on value, while for 1900, 1904, and 1905 it is based on the total cut.

PRODUCTION BY SPECIES.

Tables 4 to 28 give the quantity of each kind of lumber cut in the various States in the order of relative importance, as indicated by the reports to the Forest Service. It should be borne in mind that the total number of mills given in these tables far exceeds the total given in Table 29. If, for instance, a mill cuts oak, ash, hickory, and gum it appears in the table for each of these species.

YELLOW PINE.

The term "yellow pine" covers all of the pine in the eastern half of the United States except white and Norway pine. The principal species included are, in order of importance, longleaf, shortleaf, loblolly, and pitch pine.

In 1905, 3,162 mills, as shown by Table 4, reported a cut of 8,771,966,000 feet of yellow pine. It will be seen from the table that Louisiana leads, with 1,737,960,000 feet, or 19.8 per cent of the total. Then comes Arkansas, with 1,024,011,000 feet, or 11.7 per cent; Mississippi, with 1,017,191,000 feet, or 11.6 per cent; Texas, with 910,465,000 feet, or 10.4 per cent; North Carolina, with 837,366,000 feet, or 9.5 per cent; Alabama, with 744,192,000 feet, or 8.5 per cent; Georgia, with 663,831,000 feet, or 7.6 per cent; Florida, with 601,374,000 feet, or 6.9 per cent; Virginia, with 496,895,000 feet, or 5.7 per cent; and South Carolina, with 406,502,000 feet, or 4.6 per cent. These ten States produced over 96 per cent of the total amount of yellow pine reported. A relatively small amount was cut in Missouri and Maryland, and a little was reported from sixteen other States.

The annual cut of yellow pine has probably not yet reached its maximum, and this timber will undoubtedly hold first rank in the point of output for several years.

TABLE 4.—*Cut of yellow pine in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Louisiana	168	1,737,960	19.8	Virginia	340	496,895	5.7
Arkansas	235	1,024,011	11.7	South Carolina	191	406,502	4.6
Mississippi	241	1,017,191	11.6	Missouri	63	161,128	1.8
Texas	153	910,465	10.4	Maryland	77	85,023	.9
North Carolina	551	837,366	9.5	All others	410	86,028	1.0
Alabama	290	744,192	8.5				
Georgia	326	663,831	7.6	Total	3,162	8,771,966	100.0
Florida	117	601,374	6.9				

WHITE PINE.

The cut of white pine by States is given in Table 5. White pine in greater or less quantity was reported from twenty-four States. Norway or red pine is included with white pine, since the two species are cut and sold together under the name of "northern pine" in the Lake States, and it is impossible to determine exactly the proportion of Norway. It is safe to say, however, that at present at least 30 per cent of the pine cut in Michigan, Wisconsin, and Minnesota is Norway pine, or over 1,000,000,000 feet annually.

TABLE 5.—*Cut of white pine in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Minnesota	128	1,847,072	37.9	Pennsylvania	366	87,097	1.8
Wisconsin	289	1,467,078	30.1	Illinois	4	32,794	.7
Michigan	252	463,308	9.5	West Virginia	46	31,459	.7
New Hampshire	248	211,586	4.3	North Carolina	77	28,438	.6
Maine	299	201,867	4.1	Virginia	51	22,200	.5
Massachusetts	226	176,340	3.6	All others	256	65,878	1.4
Iowa	7	122,757	2.5				
New York	728	110,155	2.3	Total	2,977	4,868,020	100.0

The table shows that 2,977 firms reported a cut of 4,868,020,000 feet of white and Norway pine. Minnesota is the leading State, with 1,847,072,000 feet, or 37.9 per cent of the total. Wisconsin comes second with 1,467,078,000 feet, or 30.1 per cent. Michigan stands third, with 463,308,000 feet, or 9.5 per cent. Then follow New Hampshire, Maine, Massachusetts, and other States. It will be noted that Iowa is credited with 122,757,000 feet and Illinois with 32,794,000 feet. This lumber was cut in mills along the Mississippi from Minnesota logs, and if Minnesota is credited with this timber, the output of white and Norway pine in the Lake States was over 80 per cent of the entire cut of these species. The Census figures upon the cut of white and Norway pine in these three States in 1899 were: Wisconsin, 2,412,688,000 feet; Minnesota, 2,253,391,000 feet; and Michigan, 1,274,923,000 feet—a total of 5,941,002,000 feet, against 3,777,458,000 feet in 1905. The falling off has been greatest in Michigan, but the turning point has been passed even in Minnesota, and a decreasing output of pine can be looked for from the Lake States from year to year.

DOUGLAS FIR.

Douglas fir now ranks third in importance as a lumber producer in the United States, and it will hold second place within a short time. It is unfortunate that this species has so many names. "Red fir," "Douglas spruce," "yellow fir," and "Oregon pine" are other terms given it, and confusion is constantly arising in consequence. All are more or less justified by the circumstance that, botanically, the tree is neither a fir, a spruce, nor a pine. The cut for 1905, 4,319,479,000 feet, is given in Table 6. Of this amount, 427 mills in Washington cut 3,125,325,000 feet, or 72.4 per cent, and 281 mills in Oregon cut 1,076,695,000 feet, or 24.9 per cent. California reported 100,816,000 feet, and 16,643,000 feet was reported from 5 other western States.

There is a large amount of Douglas fir stumpage in Washington and Oregon, and the cut of this species will largely increase in the near future. In fact, the output of Douglas fir promises before many years to equal that of southern yellow pine and eventually to surpass it as the stumpage of the latter is reduced.

TABLE 6.—*Cut of Douglas fir in 1905.*

State.	Number of mills.	M feet.	Per cent.
Washington	427	3,125,325	72.4
Oregon	281	1,076,695	24.9
California	64	100,816	2.3
All others	24	16,643	.4
Total	796	4,319,479	100.0

HEMLOCK.

The amount of hemlock cut last year by 3,023 mills was 2,804,083,000 feet, as shown in Table 7. Pennsylvania leads with 920,854,000 feet, practically one-third of the total output, followed by Wisconsin, with 610,225,000 feet, or 21.8 per cent; and Michigan, with 569,810,000 feet, or 20.3 per cent; the three States producing three-fourths of the total quantity reported. Only a relatively small proportion was cut in any other State, but the production was widely scattered, as may be seen from the fact that returns were received from twenty-six States.

TABLE 7.—*Cut of hemlock in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Pennsylvania	415	920,854	32.8	Maine	257	86,753	3.1
Wisconsin	241	610,225	21.8	Washington	42	84,773	3.0
Michigan	299	569,810	20.3	All others	763	182,474	6.5
New York	1,006	179,550	6.4				
West Virginia	111	169,644	6.1	Total	3,023	2,804,083	100.0

It is of particular interest to note that 84,773,000 feet of hemlock was reported from the State of Washington. This is the western species, the lumber of which is freer from defects and of higher quality than that of the eastern species. So great has been the prejudice against the name "hemlock" in the West, however, that until very recently hemlock lumber has been mixed in with other lumber or sold under names which disguised its identity. The actual cut of western hemlock in 1905 was undoubtedly greater than the amount reported. The Census gave a cut of only 204,000 feet of this species for Washington in 1899, which indicates the difficulty of securing accurate figures upon it.

SPRUCE.

No attempt was made to distinguish the different kinds of spruce in the reports, but it will be understood, of course, that the spruce of Washington is different from that of Maine, and that altogether several species are cut for lumber. It is probable that a small amount of Douglas fir was reported as spruce by western operators.

TABLE 8.—*Cut of spruce in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Maine	238	358,758	30.7	Oregon	23	57,208	4.9
New York	329	211,076	18.1	Massachusetts	39	31,980	2.8
Washington	70	179,864	15.4	All others	244	48,622	4.2
Vermont	244	111,650	9.6				
West Virginia	35	107,072	9.2	Total	1,333	1,165,940	100.0
New Hampshire	111	59,710	5.1				

In 1905, 1,133 mills cut 1,165,940,000 feet of spruce, as shown by Table 8. Maine is far in the lead, as it has been for many years. The quantity reported from Maine for 1905 was 358,758,000 feet, or 30.7 per cent of the total. New York comes next with 211,076,000 feet, or 18.1 per cent, followed by Washington with 179,864,000 feet, or 15.4 per cent; Vermont with 111,650,000 feet, or 9.6 per cent; West Virginia with 107,072,000 feet, or 9.2 per cent, and New Hampshire with 59,710,000 feet, or 5.1 per cent. Oregon reported 4.9 per cent of the total, Massachusetts 2.8 per cent, and all other States combined 4.2 per cent. Altogether the cutting of spruce was reported from twenty-four different States.

WESTERN YELLOW PINE.

This is another species, concerning the trade name of which unfortunate difficulties have arisen. Botanically it is *Pinus ponderosa*, and is classed with the pitch or yellow pines. The wood, however, is less resinous and lighter than that of the southern yellow pines, and many manufacturers insist, with considerable reason, that it is so nearly like white pine that the word "white" should appear in the name. It is sold principally under the names of western pine, western white pine, and California white pine. The cut reported for 1905 is 988,542,000 feet, given in Table 9. California leads with 363,932,000 feet, or 36.8 per cent; Washington is second with 217,074,000 feet, or 22 per cent, and Montana third, with 101,998,000 feet, or 10.3 per cent. Then follow Oregon with 8.6 per cent of the total, Idaho with 8.4 per cent, and Colorado with 4.9 per cent. Six other States cut 9 per cent of the total.

TABLE 9.—*Cut of western yellow pine in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
California	110	363,932	36.8	Colorado	37	48,223	4.9
Washington	109	217,074	22.0	All others	60	88,720	9.0
Montana	19	101,998	10.3				
Oregon	44	84,955	8.6	Total	425	988,542	100.0
Idaho	46	83,640	8.4				

CYPRESS.

The cut of cypress by 468 mills in 1905 was 753,369,000 feet. Louisiana, as shown by Table 10, is by far the largest producer, with a cut of 487,504,000 feet, or 64.7 per cent of the total. Relatively small amounts were cut in fourteen other States. Arkansas reported 8 per cent of the total, Florida 7.4 per cent, Mississippi 7.2 per cent, South Carolina 3.5 per cent, North Carolina 2.7 per cent, and the remaining States combined 6.5 per cent.

TABLE 10.—*Cut of cypress in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Louisiana	73	487,504	64.7	North Carolina	52	20,423	2.7
Arkansas	98	60,252	8.0	All others	134	49,194	6.5
Florida	17	55,569	7.4				
Mississippi	74	54,211	7.2	Total	468	753,369	100.0
South Carolina	20	26,216	3.5				

The output of cypress has apparently not yet reached its maximum, as the Forest Service figures for 1905 are slightly greater than the Census figures for 1904, and over 50 per cent larger than those of the Census for 1899.

REDWOOD.

The cut of redwood, 411,689,000 feet, reported by 55 mills, is given in Table 11. The area of production of this wood is very limited, but there is yet a comparatively large amount of stumpage and it is probable that the annual output will not fall below the present quantity for some time.

TABLE 11.—*Cut of redwood in 1905.*

State.	Number of mills.	M. feet.	Per cent.
California	55	411,689	100.0

CEDAR.

Like spruce, "cedar" covers several species, the wood of which has similar properties. Cedar is used principally for poles, piles, posts, and shingles, and it is only in the State of Washington that any considerable quantity of it is cut into lumber. The amount of cedar lumber reported is given in Table 12. Of the total of 363,900,000 feet, Washington produced 69.3 per cent, Maine 8.6 per cent, Oregon 7 per cent, Idaho 4.3 per cent, Michigan 3.4 per cent, Wisconsin 3.2 per cent, and twelve other States combined 4.2 per cent.

TABLE 12.—*Cut of cedar in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Washington	140	252,174	69.3	Wisconsin	18	11,591	3.2
Maine	52	31,267	8.6	All others	121	15,298	4.2
Oregon	65	25,428	7.0				
Idaho	8	15,560	4.3	Total	433	363,900	100.0
Michigan	29	12,582	3.4				

SUGAR PINE.

The cut of sugar pine by 63 mills in 1905 is given in Table 13. The range of merchantable sugar pine is practically restricted to the west side of the Sierra Nevadas and portions of the Coast range, and 97.6 per cent of the cut of 123,085,000 feet reported was in California. The cut of sugar pine in 1899, according to the Census, was only 53,558,000 feet, which indicates the rapid increase in output the last few years.

TABLE 13.—*Cut of sugar pine in 1905.*

State.	Number of mills.	M feet.	Per cent.
California	53	120,002	97.6
Oregon	10	3,083	2.4
Total	63	123,085	100.0

WESTERN WHITE PINE.

Western white pine is a true white pine, and very closely resembles the eastern white pine, both in the appearance of the tree and the properties of the wood. It is cut principally in a rather small territory covering portions of Montana, Idaho, and eastern Washington. So far as could be determined from the reports, the cut by 39 mills in these three States in 1905 was 115,678,000 feet, as shown in Table 14. It is quite certain, however, that the figures, particularly those for Washington, include considerable western yellow pine, which is frequently marketed under the name of white pine.

TABLE 14.—*Cut of western white pine in 1905.*

State.	Number of mills.	M feet.	Per cent.
Idaho	14	62,453	54.0
Washington	20	32,664	28.2
Montana	5	20,561	17.8
Total	39	115,678	100.0

OAK.

The cut of white and red oak reported for 1905 is given in Tables 15 and 16. No further separation into the various kinds of oak was practicable. Without question, a number of species were included under each head by the manufacturers, and quite probably in making out their reports they did not, in many cases, distinguish carefully between the white and red oaks. The oaks are among the most widely distributed hardwoods, and reports of oak lumber were received from thirty-five States. The total amount of white oak reported was 1,210,216,000 feet, of which West Virginia produced 12.9 per cent; Kentucky, 12.7 per cent; Ohio, 11.4 per cent; Tennessee, 10.6 per cent, and Indiana, 10 per cent. The total amount of red oak reported was 623,553,000 feet, of which Tennessee cut 12.8 per cent, Arkansas, 10.8 per cent; Kentucky, 9.3 per cent, and Indiana, 8.8 per cent.

While the Forest Service figures upon the output of oak in 1905 are incomplete, there is no doubt that the cut is decreasing because of the diminished supply of stumpage. The Census reports show a decrease of about 945,000,000 feet between 1899 and 1904.

TABLE 15.—*Cut of white oak in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
West Virginia	252	156,099	12.9	Mississippi	137	58,899	4.9
Kentucky	380	153,682	12.7	North Carolina	333	40,622	3.4
Ohio	467	137,268	11.4	Missouri	141	30,888	2.6
Tennessee	412	127,599	10.6	Alabama	90	20,302	1.7
Indiana	380	121,091	10.0	All others	1,142	106,744	8.5
Arkansas	270	100,502	8.3				
Pennsylvania	469	92,998	7.7	Total	4,726	1,210,216	100.0
Virginia	253	63,432	5.3				

TABLE 16.—*Cut of red oak in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Tennessee	367	79,793	12.8	Ohio	385	24,575	4.0
Arkansas	214	67,514	10.8	Virginia	167	23,298	3.8
Kentucky	277	58,056	9.3	Illinois	145	23,072	3.7
Indiana	375	54,725	8.8	Wisconsin	201	20,097	3.2
Mississippi	112	41,453	6.6	All others	1,207	123,128	19.8
North Carolina	261	41,411	6.6				
Pennsylvania	403	40,054	6.4	Total	4,263	623,553	100.0
West Virginia	149	26,378	4.2				

MAPLE.

The cut of maple reported by 2,765 mills in 1905 was 608,746,000 feet, as shown in Table 17. Michigan is by far the greatest producer of maple lumber, reporting 357,611,000 feet, or 58.8 per cent of the total. Vermont cut 53,745,000 feet, or 8.9 per cent; Pennsylvania 48,883,000 feet, or 8 per cent; New York 44,550,000 feet, or 7.3 per cent; Wisconsin 40,425,000 feet, or 6.6 per cent; Indiana 15,828,000 feet, or 2.6 per cent, and twenty other States, combined, 47,704,000 feet, or 7.8 per cent. There has apparently been little change in the total output of maple for several years.

TABLE 17.—*Cut of maple in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Michigan	311	357,611	58.8	Indiana	298	15,828	2.6
Vermont	182	53,745	8.9	All others	1,002	47,704	7.8
Pennsylvania	326	48,883	8.0				
New York	421	44,550	7.3	Total	2,765	608,746	100.0
Wisconsin	225	40,425	6.6				

YELLOW POPLAR.

Table 18 shows the cut of yellow poplar reported by 2,115 manufacturers. This was 582,748,000 feet. Kentucky is the leading State, with 21 per cent of the total, followed by West Virginia, with 19.2 per cent; Tennessee, with 19 per cent; Ohio, with 9.5 per cent;

North Carolina, with 8.3 per cent; Virginia, with 7.1 per cent; Alabama, with 6.5 per cent, and small amounts in nine other States. The Forest Service figures upon yellow poplar are incomplete, but probably the cut of this species is still decreasing. The Census figures show a heavy decrease between 1899 and 1904.

TABLE 18.—*Cut of yellow poplar in 1905.*

State.	Number of mills.	M feet.	Per cent.
Kentucky	309	122,485	21.0
West Virginia	197	112,230	19.2
Tennessee	361	110,480	19.0
Ohio	203	55,140	9.5
North Carolina	274	48,122	8.3
Virginia	156	41,294	7.1
Alabama	75	37,808	6.5
Indiana	251	18,143	3.1
Mississippi	63	14,165	2.4
Georgia	78	11,128	1.9
All others	148	11,753	2.0
Total	2,115	582,748	100.0

RED GUM.

In 1905, 898 mills cut 316,588,000 feet of red gum. The leading State, as shown by Table 19, is Arkansas, which cut 91,942,000 feet, or 29 per cent of the total. Missouri comes second, with 71,948,000 feet, or 22.7 per cent; and Mississippi third, with 47,320,000 feet, or 15 per cent. Then follow Tennessee with 11.7 per cent, Kentucky with 6.2 per cent, Indiana with 4.1 per cent, and Illinois with 3.2 per cent. Eleven other States combined cut 8.1 per cent. The cut of red gum has increased to some extent in the last few years, the Census figures on gum of all kinds in 1899 being 268,251,000 feet.

TABLE 19.—*Cut of red gum in 1905.*

State.	Number of mills.	M feet.	Per cent.
Arkansas	148	91,942	29.0
Missouri	60	71,948	22.7
Mississippi	95	47,320	15.0
Tennessee	135	37,147	11.7
Kentucky	121	19,758	6.2
Indiana	94	12,858	4.1
Illinois	51	10,072	3.2
All others	217	25,543	8.1
Total	921	316,588	100.0

BASSWOOD.

In 1905, 258,390,000 feet of basswood was cut by 2,212 mills, as given in Table 20. Wisconsin produced nearly one-half the total, or 47.1 per cent. Michigan ranks second, with 18.1 per cent, followed by New York with 9.6 per cent, Pennsylvania with 4.9 per cent, and West Virginia with 4 per cent. Fifteen other States combined cut 16.3 per cent. The cut of basswood given by the Census of 1899 was 280,025,000 feet, but there has been some decrease since that time.

TABLE 20.—*Cut of basswood in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Wisconsin	300	121,857	47.1	West Virginia	94	10,251	4.0
Michigan	280	46,759	18.1	All others	957	42,243	16.3
New York	375	24,760	9.6				
Pennsylvania	206	12,520	4.9	Total	2,212	258,390	100.0

BIRCH.

In 1905, 1,327 mills cut 240,704,000 feet of birch. The figures for the leading States are given in Table 21. By far the largest amount was cut in Wisconsin, which reported 95,191,000 feet, or 39.5 per cent of the total. Michigan cut 39,693,000 feet, or 16.5 per cent; New York, 24,760,000 feet, or 10.3 per cent; Pennsylvania, 23,852,000 feet, or 9.9 per cent; Vermont, 21,750,000 feet, or 9 per cent; Maine, 20,164,000 feet, or 8.4 per cent; and nine other States, combined, 15,294,000 feet, or 6.4 per cent of the total. There has been a relatively large increase in the cut of birch since 1899, for which year the Census reported 128,410,000 feet.

TABLE 21.—*Cut of birch in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Wisconsin	223	95,191	39.5	Maine	122	20,164	8.4
Michigan	191	39,693	16.5	All others	239	15,294	6.4
New York	225	24,760	10.3				
Pennsylvania	142	23,852	9.9	Total	1,327	240,704	100.0
Vermont	185	21,750	9.0				

COTTONWOOD.

The cut of cottonwood reported for 1905 by 422 mills was 236,000,000 feet. The leading State, as shown by Table 22, was Arkansas, with 90,920,000 feet, or 38.5 per cent of the total. Next in order came Mississippi, with 43,462,000 feet, or 18.4 per cent; Louisiana, with 38,693,000, or 16.4 per cent; Tennessee, with 28,683,000, or 12.2 per cent; and small amounts in twenty-three other States, aggregating 34,242,000 feet, or 14.5 per cent of the total. The cut of cottonwood in 1899, according to Census figures, was 401,437,000 feet, so it is probable that the cut in 1905 was considerably larger than is indicated by the reports to the Forest Service, though not equal to that of 1899.

Table 22.—*Cut of cottonwood in 1905.*

State.	Number of mills.	M feet.	Per cent.
Arkansas	66	90,920	38.5
Mississippi	30	43,462	18.4
Louisiana	15	38,693	16.4
Tennessee	16	28,683	12.2
All others	295	34,242	14.5
Total	422	236,000	100.0

ELM.

The cut of elm reported for 1905 was 227,038,000 feet, as shown by Table 23. Of this amount, Wisconsin cut 31 per cent; Michigan, 25.2 per cent; Indiana, 11 per cent; Ohio, 9.9 per cent; Arkansas, 4.1 per cent; Missouri, 3.7 per cent; and twenty-six other States, combined, 15.1 per cent. The cut of elm given by the Census for 1899 was 388,095,000 feet. There has been a falling off in the output since that time, but the cut in 1905 was probably somewhat larger than is indicated from the reports to the Forest Service.

Table 23.—*Cut of elm in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Wisconsin	254	70,327	31.0	Missouri	72	8,425	3.7
Michigan	254	57,305	25.2	All others	688	34,285	15.1
Indiana	299	24,911	11.0				
Ohio	316	22,464	9.9	Total	1,937	227,038	100.0
Arkansas	54	9,321	4.1				

CHESTNUT.

The cut of chestnut by 1,599 mills in 1905 was 224,413,000 feet. The figures for the leading States are given in Table 24. Pennsylvania heads the list, with 41,018,000 feet, or 18.3 per cent of the total; Tennessee comes next, with 28,010,000 feet, or 12.5 per cent; and then follow North Carolina, Connecticut, and West Virginia, with over 25,000,000 feet each and approximately equal amounts. Kentucky reported 6.7 per cent of the total; Virginia, 6.2 per cent; Maryland, 5 per cent; Massachusetts, 4.6 per cent, and thirteen other States combined, 12.6 per cent. The cut of chestnut in 1904 was 243,537,000 feet, according to the Census.

TABLE 24.—*Cut of chestnut in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Pennsylvania	397	41,018	18.3	Virginia	84	13,994	6.2
Tennessee	171	28,010	12.5	Maryland	31	11,228	5.0
North Carolina	117	25,628	11.4	Massachusetts	117	10,388	4.6
Connecticut	73	25,562	11.4	All others	321	28,312	12.6
West Virginia	141	25,256	11.3				
Kentucky	147	15,017	6.7	Total	1,599	224,413	100.0

BEECH.

The cut of beech reported for 1905 is given in Table 25. The output of 1,853 mills was 219,000,000 feet. Michigan is the leading State, with 59,896,000 feet, or 27.3 per cent of the total. Pennsylvania comes next, with 53,494,000 feet, or 24.7 per cent; and then Indiana, with 30,827,000 feet, or 14 per cent. Beech was reported from seventeen other States, but only relatively small amounts were cut outside of Michigan, Pennsylvania, and Indiana, which furnished 66 per cent of the total quantity reported. The Census gave no figures upon beech in 1899, so there is no basis for comparison.

TABLE 25.—*Cut of beech in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Michigan	192	59,896	27.3	Vermont	123	7,829	3.6
Pennsylvania	238	53,494	24.7	Kentucky	129	7,787	3.5
Indiana	285	30,827	14.0	All others	342	20,110	9.1
New York	275	24,760	11.3				
Ohio	269	14,297	6.5	Total	1,853	219,000	100.0

ASH.

In 1905, 159,634,000 feet of ash was cut by 2,653 mills. As shown by Table 26, Michigan was the leading State, with 26,141,000 feet, or 16.5 per cent of the total. Next comes Wisconsin, with 14,588,000 feet, or 9.2 per cent, and then Indiana, Arkansas, and Kentucky, with approximately 13,000,000 feet, or over 8 per cent each. Relatively small amounts were reported from twenty-nine other States, but over half of the output came from the five States mentioned. The cut of ash in 1899, according to the Census, was 256,431,000 feet, but the output is decreasing, because of the scarcity of stumpage.

TABLE 26.—*Cut of ash in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Michigan	253	26,141	16.5	South Carolina	12	7,460	4.7
Wisconsin	203	14,588	9.2	Pennsylvania	237	6,691	4.2
Indiana	279	13,340	8.4	Tennessee	154	5,819	3.6
Arkansas	88	13,034	8.2	All others	922	41,000	25.9
Kentucky	157	12,939	8.1				
Ohio	280	10,539	6.1	Total	2,653	159,634	100.0
Mississippi	68	8,083	5.1				

HICKORY.

The cut of hickory reported for 1905 by 1,829 mills was 95,803,000 feet. The figures for the principal States are given in Table 27. Indiana leads, with 15,138,000 feet, or 15.8 per cent; followed by Arkansas, with 13,262,000 feet, or 13.8 per cent; Kentucky, with 12,894,000 feet, or 13.4 per cent; Tennessee, with 11,958,000 feet, or 12.5 per cent and Ohio, with 11,054,000 feet, or 11.5 per cent. Mississippi reported 6.5 per cent of the total, Illinois 5.6 per cent, Pennsylvania 5.4 per cent, Missouri 3.6 per cent, West Virginia 2.4 per cent. Twenty other States combined reported 9.5 per cent. The total cut of hickory in 1905 reported to the Forest Service is practically the same as that given by the Census for 1899, but there is no doubt that these figures are considerably below the actual annual consumption of hickory. A considerable amount of hickory, particularly spoke material, is sold by the piece, and consequently was not reported as lumber. The members of the National Hickory Association estimate their annual requirements as equivalent to 250,000,000 board feet.

Table 27.—*Cut of hickory in 1905.*

State.	Number of mills.	M feet.	Per cent.	State.	Number of mills.	M feet.	Per cent.
Indiana	319	15,138	15.8	Pennsylvania	188	5,146	5.4
Arkansas	81	13,262	13.8	Missouri	68	3,430	3.6
Kentucky	148	12,894	13.4	West Virginia	74	2,310	2.4
Tennessee	148	11,958	12.5	All others	308	9,064	9.5
Ohio	352	11,054	11.5				
Mississippi	40	6,239	6.5	Total	1,829	95,803	100.0
Illinois	103	5,308	5.6				

OTHER KINDS.

Several kinds of lumber which are cut only in relatively small amounts, and the States in which they are chiefly produced, are given in Table 28. These are: Larch, 76,173,000 feet; tamarack, 64,463,000 feet; white fir, 52,725,000 feet; tupelo, 35,794,000 feet; balsam, 35,506,000 feet; and walnut, 29,851,000 feet. While these woods are of minor importance, their output, with the exception of walnut has increased strongly since 1899. The cut of larch and tamarack combined for that year is given by the Census as only 49,802,000 feet, while no figures at all are given for balsam and tupelo.

Table 28.—*Cut of minor species in 1905.*

Kind.	M feet.	States mostly cut in.
Larch	76,173	Montana, Washington, Idaho, Oregon.
Tamarack	64,463	Wisconsin, Michigan, Minnesota.
White fir	52,725	California, Washington, Oregon.
Tupelo	35,794	Virginia, Louisiana, Alabama, North Carolina, etc.
Balsam	35,506	Maine, Vermont, New York, etc.
Walnut	29,851	Indiana, Ohio, Illinois, Missouri, Kentucky, Tennessee, etc.

PRODUCTION BY STATES.

The production of lumber in 1905 by 11,666 mills is given by States and species in Table 29. The following States led in the production of the kinds of timber specified:

Arkansas: Red gum and cottonwood.
California: Western yellow pine and redwood.
Idaho: Western white pine.
Indiana: Hickory and walnut.
Kentucky: Yellow poplar.
Louisiana: Yellow pine and cypress.
Maine: Spruce and balsam.
Michigan: Maple, beech, and ash.
Minnesota: White pine.
Montana: Larch.
Pennsylvania: Hemlock and chestnut.
Tennessee: Red oak.
Washington: Douglas fir and cedar.
West Virginia: White oak.
Wisconsin: Basswood, birch, elm, and tamarack.

SHINGLES.

The cut of shingles in 1905 by 2,547 mills is given in Table 30. The total number reported was 15,340,909,000, of which western cedar furnished 9,595,245,000, or 62.5 per cent; cypress 1,514,478,000, or 9.9 per cent; eastern cedar 1,313,297,000, or 8.6 per cent; Douglas fir 911,173,000, or 5.9 per cent. The cut of redwood shingles reported was 483,887,000, or 3.1 per cent of the total; of yellow pine 459,472,000, or 3 per cent; of white and Norway pine 382,742,000, or 2.5 per cent; and of hemlock 135,020,000, or 0.9 per cent. The shingles cut of other species than those mentioned amounted to 3.6 per cent of the total.

The total number of shingles cut in 1899, according to the Census, was 11,947,620,000. Most of the increase in cut in 1905 consists of western red cedar.

TABLE 30.—*Cut of shingles in 1905.*

Kind.	Number of thousands.	Per cent.	State.	Number of mills.	Number of thousands.	Per cent.
Western cedar	9,595,245	62.5	Washington	515	10,509,914	68.6
Cypress	1,514,478	9.9	Michigan	153	875,051	5.7
Eastern cedar	1,313,297	8.6	Louisiana	62	743,398	4.8
Douglas fir	911,173	5.9	California	71	547,863	3.6
Redwood	483,887	3.1	Wisconsin	172	417,046	2.7
Yellow pine	459,472	3.0	Maine	214	312,497	2.0
White and Norway pine	382,742	2.5	Arkansas	47	302,135	2.0
Hemlock	135,020	.9	Alabama	50	285,080	1.8
All others	545,595	3.6	Minnesota	68	193,738	1.3
			Georgia	112	177,986	1.2
			Florida	40	154,524	1.0
			All others	1,043	821,677	5.3
Total	15,340,909	100.0	Total	2,547	15,340,909	100.0

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TABLE 29.—*Lumber cut in the United States in 1905 by 11,666 mills.*

	State.	Number of mills.	Aggregate.	Softwoods.																Hardwoods.																	
				Total.	Yellow pine.	White pine.	Douglas fir.	Hemlock.	Spruce.	Western yellow pine.	Cypress.	Redwood.	Cedar.	Sugar pine.	Western white pine.	Larch.	Tamarack.	White fir.	Balsam.	Total.	White oak.	Red oak.	Maple.	Yellow poplar.	Red gum.	Basswood.	Birch.	Cottonwood.	Elm.	Chestnut.	Beech.	Ash.	Hickory.	Tupelo.	Walnut.	Mixed.	
			M feet.	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	*M feet.*	
1	Alabama	326	843,897	751,721	744,192						7,529									92,176	20,302	12,923		37,808	9,524			420	32	305		1,471	1,005	6,362		2,024	1
2	Arkansas	466	1,488,589	1,084,263	1,024,011						60,252									404,326	100,502	67,514		1,650	91,942			90,920	9,321			13,034	13,262	2,828	136	13,217	2
3	California	175	1,061,608	1,058,852			100,816		2,000	363,932		411,689	8,783	120,002				51,630		2,756																2,756	3
4	Colorado	52	56,753	56,653					8,430	48,223										100								100									4
5	Connecticut	93	69,845	19,215	1,483	14,788		2,684	100				145						15	50,630	6,472	4,856	1,211			346	722		107	25,562	353	904	1,409			8,688	5
6	Delaware	29	12,260	7,260		7,200							60							5,000	2,260	1,685	60							21	21	50	13			890	6
7	Florida	123	658,007	656,943	601,374						55,569									1,064	55	18		359	283			38	3			85	81	137		5	7
8	Georgia	349	712,604	679,143	663,831			25			15,287									33,461	8,615	5,895		11,128	1,007			80	110	2,772		553	1,330	736	10	1,225	8
9	Idaho	54	212,725	183,699			10,177	1,525	255	83,640			15,560		62,453	10,089				29,026								5,442								23,584	9
10	Illinois	174	119,065	33,802		32,794					1,008									85,263	15,529	23,072	2,851	760	10,072	48	26	924	7,584	7	1,507	873	5,308		4,472	12,230	10
11	Indiana	461	352,362	460		15		15			430									351,902	121,091	54,725	15,828	18,143	12,858	6,609		2,187	24,911	1,087	30,827	13,340	15,138		8,957	26,201	11
12	Indian Territory	18	11,667	5,216	5,216															6,451	1,440	2,130			100			2,141	140			440	60				12
13	Iowa	30	129,472	122,757		122,757														6,715	1,139	936	938			515		1,187	1,503						104	393	13
14	Kentucky	426	464,676	35,772	7,954	5,505		18,647	2,122		1,544									428,904	153,682	58,056	1,601	122,485	19,758	6,116	25	653	2,351	15,017	7,787	12,939	12,894		3,704	11,836	14
15	Louisiana	236	2,293,809	2,225,464	1,737,960						487,504									68,345	6,568	1,974		2,797	2,155			38,693	7			1,493	728	6,580		7,350	15
16	Maine	373	745,705	703,979	3,435	201,867		86,753	358,758				31,267						21,899	41,726	1,740	4,338	4,129			2,386	20,164		421	710	2,750	1,279	42			3,767	16
17	Maryland	114	163,749	111,179	85,023	1,785		20,394	3,977											52,570	18,261	11,894	2,463			913	1,150		61	11,228	759	601	524		20	4,696	17
18	Massachusetts	251	252,804	222,626	2,504	176,340		11,208	31,980				77						517	30,178	1,900	2,743	1,827			431	1,563		72	10,388	2,169	614	249			8,222	18
19	Michigan	437	1,719,687	1,077,549		463,308		569,810	11,592				12,582				18,726		1,531	642,138	6,521	5,633	357,611			46,759	39,693		57,305		59,896	26,141			154	42,425	19
20	Minnesota	174	1,925,804	1,890,610		1,847,072		24,144	5,592				785				13,017			35,194	3,671	2,044	2,638			7,926	4,228		5,251		310	2,063				7,063	20
21	Mississippi	355	1,299,390	1,071,402	1,017,191						54,211									227,988	58,899	41,453		14,165	47,320			43,462	2,037			8,083	6,239	3,928	144	2,258	21
22	Missouri	225	362,217	176,964	161,128						15,836									185,253	30,888	39,977	2,739	2,508	71,948	17		7,486	8,425		85	4,308	3,430		3,861	9,581	22
23	Montana	23	189,291	175,935			6,132	5,000	155	101,998			3,000		20,561	39,089				13,356																13,356	23
24	New Hampshire	278	340,727	305,843	1,985	211,586		30,660	59,710				200						1,702	34,884	1,665	4,847	4,343			1,248	7,516		50	3,111	2,929	1,390	18			7,767	24
25	New Jersey	66	17,704	7,978	5,050	691		314					1,923							9,726	2,765	2,069	122			11	24		160	3,477	23	120	770			185	25
26	New York	1,167	750,280	504,203	1,915	110,155		179,550	211,076				153						1,354	246,077	7,425	12,375	44,550			24,760	24,760		7,425	7,425	24,760	9,900	520			82,177	26
27	North Carolina	671	1,080,602	892,078	837,366	28,438		5,851			20,423									188,524	40,622	41,411		48,122	3,073			713	52	25,628		4,111	729	5,608	88	18,367	27
28	Ohio	541	331,552	2,987	505	126		241	2,115											328,565	137,268	24,575	11,002	55,140	566	7,965		972	22,464	5,542	14,297	10,539	11,054		4,477	22,704	28
29	Oregon	319	1,262,610	1,255,938			1,076,695	3,884	57,208	84,955			25,428	3,083		3,610		1,075		6,672			3,009					1,150				1,530				983	29
30	Pennsylvania	714	1,397,164	1,024,739	15,929	87,097		920,854	834				5						20	372,425	92,998	40,054	48,883			12,520	23,852		2,323	41,018	53,494	6,691	5,146		919	44,527	30
31	Rhode Island	16	14,054	8,438	173	7,500		730					35							5,616	805	515	248				40			3,615		159	132			102	31
32	South Carolina	205	466,478	434,190	406,502	150		1,322			26,216									32,288	1,810	1,273		3,679	4,887			3,686	17	59		7,460	81	1,005	4	8,327	32
33	South Dakota	15	11,502	11,502						11,502																											33
34	Tennessee	495	540,920	68,598	36,294	18,833		8,845	1,834		2,792									472,322	127,599	79,793	1,323	110,480	37,147	2,273		28,683	3,369	28,010	2,083	5,819	11,958		2,306	31,479	34
35	Texas	165	929,863	911,785	910,465						1,320									18,078	5,359	2,848			1,522			4,608	47			1,988	314			1,392	35
36	Utah	21	3,618	3,553			150		10	3,393										65								65									36
37	Vermont	287	266,676	167,719	273	9,285		37,911	111,650				132						8,468	98,957	257	2,094	53,745			5,439	21,750		947	181	7,829	3,269	124			3,322	37
38	Virginia	458	715,197	531,617	496,895	22,200		9,074			3,448									183,580	63,432	23,298		41,294	2,260			1,261	20	13,994		656	910	8,610	51	27,794	38
39	Washington	557	3,917,166	3,915,279			3,125,325	84,773	179,864	217,074			252,174		32,664	23,385		20		1,887			231					299				205				1,152	39
40	West Virginia	285	672,902	311,478	3,312	31,450		169,644	107,072											361,424	156,099	26,378	6,939	112,230	166	10,251		65	116	25,256	5,507	2,938	2,310		377	12,792	40
41	Wisconsin	407	2,543,503	2,130,149		1,467,078		610,225	8,535				11,591				32,720			413,354	12,567	20,097	40,425			121,857	95,191		70,327		1,614	14,588				36,688	41
42	Wyoming	14	4,360	4,345					475	3,870										15								15									42
43	Arizona, Nevada, and New Mexico.	15	88,825	70,735			184		596	69,955										18,090																18,090	43
44	Kansas, Nebraska	6	1,272																	1,272	10	60	30					750	80				25		67	250	44
	Total	11,666	30,502,961	24,914,618	8,771,966	4,868,020	4,319,479	2,804,083	1,165,940	988,542	753,369	411,689	363,900	123,085	115,678	76,173	64,463	52,725	35,506	5,588,343	1,210,216	623,553	608,746	582,748	316,588	258,390	240,704	236,000	227,038	224,413	219,000	159,634	95,803	35,794	29,851	519,865	

Washington is far in the lead as a shingle-producing State, since it cut 68.6 per cent of the total number reported. This is because most of both the western cedar and the Douglas fir shingles come from this State. Michigan comes next in order, with 5.7 per cent, consisting mostly of cedar; then Louisiana, with 4.8 per cent, made up principally of cypress. The California shingles are mostly redwood, those of Wisconsin and Maine cedar, those of Minnesota northern pine, and those of the Southern States yellow pine and cypress.

LATH.

The total cut of lath reported for 1905 by 1,801 mills was 3,111,157,000, as shown in Table 31. White and Norway pine lead with 872,599,000, or 28.1 per cent of the total. Douglas fir ranks second, with 584,884,000, or 18.8 per cent; hemlock third, with 430,014,000, or 13.8 per cent; and yellow pine fourth, with 407,742,000, or 13.1 per cent. Practically three-fourths of the lath were of these four species. Spruce is credited with 260,039,000, or 8.4 per cent of the total; cypress with 155,825,000, or 5 per cent. Lath of other kinds and those which could not be determined are given under the head "Mixed," the number being 400,054,000, or 12.8 per cent of the total. The Census reported a production of 2,501,314,000 lath of all kinds in 1899.

TABLE 31.—*Cut of lath in 1905.*

Kind.	Number of thousands.	Per cent.	State.	Number of mills.	Number of thousands.	Per cent.
White and Norway pine	872,599	28.1	Washington	97	559,813	18.0
Douglas fir	584,884	18.8	Minnesota	80	422,025	13.3
Hemlock	430,014	13.8	Wisconsin	195	328,905	10.6
Yellow pine	407,742	13.1	Louisiana	56	259,259	8.3
Spruce	260,039	8.4	Maine	121	255,482	8.2
Cypress	155,825	5.0	Michigan	109	221,386	7.2
Mixed	400,054	12.8	Pennsylvania	211	219,143	7.0
			Oregon	34	116,456	3.8
			All others	898	728,688	23.6
Total	3,111,157	100.0	Total	1,801	3,111,157	100.0

The leading States in the production of lath are also given, in order, in Table 31, their relative importance being due to one or more of the species mentioned in the preceding paragraph. Washington comes first, with 18 per cent of the total reported, followed by Minnesota, with 13.3 per cent, Wisconsin with 10.6 per cent, Louisiana with 8.3 per cent, Maine with 8.2 per cent, Michigan with 7.2 per cent, Pennsylvania with 7 per cent, and Oregon with 3.8 per cent. These eight States produced over three-fourths of the total number of lath reported.

CROSS-TIES PURCHASED BY THE STEAM RAILROADS OF THE UNITED STATES IN 1905.

By H. M. HALE, *Forest Assistant.*

The following report upon the cross-ties purchased by the railroads in 1905 is based upon statements from 770 steam railroad companies. Of those which failed to report, only one operates more than 1,000 miles of track and that one less than 1,300. The average mileage of the remainder is approximately 45. The total mileage unreported is 8,671. Since the total trackage in the United States on January 1, 1905, was, according to Poor's Manual, 293,937 miles, the unreported trackage amounts to but 2.9 per cent of the total.

In presenting this report the Forest Service desires to acknowedge the hearty cooperation of the officials of the various companies throughout the United States in furnishing the necessary data.

These statistics do not necessarily represent the number of cross-ties used in 1905, since they are compiled from the statements of ties purchased. However, there is but little doubt that the law of averages applies sufficiently well in this instance to warrant the assumption that the total represents, with a very fair degree of accuracy, the actual number of ties laid.

PRODUCTION.

The total number of ties reported is 77,981,227, switch ties being reduced to an equivalent number of cross-ties. Of the total number of ties purchased, 14,459,521, or approximately 18.5 per cent, were for use in the construction of new track, leaving 63,521,706 for renewals. It will be noted that this is less than the total announced in the preliminary statement made by the Forest Service under date of May 17, 1906. This is the result of a correction for duplication made in compiling the preliminary report. Assuming that the unreported 2.9 per cent of trackage required ties in the same proportion as the reported trackage, the total number of ties purchased by the steam railroads of the United States in 1905 was 81,562,150. Estimating 10,000,000 additional ties for the electric lines, the total number of ties purchased last year in the United States was, in round numbers, 91,500,000.

Table 32 shows the average cost and the total value of the various kinds of ties. The values given are based upon reports of representative roads in each region and are for ties delivered on the right of way.

TABLE 32.—*Value of ties purchased by steam railroads of the United States in 1905.*

Kind of wood.	Number.	Average cost per tie.	Total.
Oak	34,677,304	$0.55	$19,072,517.20
Pine	18,351,037	.42	7,707,435.54
Cedar	6,962,827	.44	3,063,643.88
Chestnut	4,717,604	.48	2,264,449.92
Douglas fir	3,633,276	.33	1,198,981.08
Cypress	3,483,746	.33	1,149,636.18
Tamarack	3,060,082	.36	1,101,629.52
Hemlock	1,713,090	.33	565,319.70
Redwood	590,852	.20	118,170.40
Western larch	311,120	.45	140,004.00
Spruce	148,168	.35	51,858.80
Birch	35,500	.40	14,200.00
Beech	34,227	.40	13,690.80
Maple	25,500	.40	10,200.00
Miscellaneous	236,894	.48	113,709.12
Total	77,981,227	....	36,585,446.14

Table 33 gives, by species, the number and per cent of hewed and sawed ties purchased during 1905.

TABLE 33.—*Ties purchased by steam railroads of the United States in 1905.*

Kind of wood.	Hewed.			Sawed.			Total.	
	Number.	Per cent of all ties of kind.	Per cent of all hewed ties.	Number.	Per cent of all ties of kind.	Per cent of all sawed ties.	Number.	Per cent.
Oak	30,296,498	87.4	50.2	4,380,806	12.6	24.9	34,677,304	44.5
Pine	11,799,435	64.3	19.5	6,551,602	35.7	37.2	18,351,037	23.5
Cedar	4,842,651	69.6	8.0	2,120,176	30.4	12.6	6,962,827	8.9
Chestnut	3,252,046	68.9	5.4	1,465,558	31.1	8.3	4,717,604	6.1
Douglas fir	1,410,215	39.0	2.3	2,223,061	61.0	12.6	3,633,276	4.6
Cypress	3,095,760	88.9	5.1	387,986	11.1	2.2	3,483,746	4.5
Tamarack	3,049,972	99.7	5.1	10,110	.3	(a)	3,060,082	4.0
Hemlock	1,599,283	93.4	2.6	113,807	6.6	.6	1,713,090	2.2
Redwood	500,904	84.8	.8	89,948	15.2	.5	590,852	.8
Western larch	247,425	77.9	.4	63,695	22.1	.3	311,120	.4
Spruce	60,190	40.6	.1	87,978	59.4	.5	148,168	.2
Birch	25,500	71.8	.1	10,000	28.2	(a)	35,500	(a)
Beech	6,020	17.9	(a)	28,207	82.1	.1	34,227	(a)
Maple	25,000	98.0	.1	500	2.0	(a)	25,500	(a)
Miscellaneous	187,942	79.3	.3	48,952	21.7	.2	236,894	.3
Total	60,398,841	[b] 77.4	100.0	17,582,386	[b] 22.6	100.0	77,981,227	100.0

[a] Less than one-tenth of 1 per cent.

[b] Per cent of all ties.

The table shows that oak, the greater part of which is doubtless some variety of white oak, furnishes 44.5 per cent, or almost one-half, of the total number of ties. Assuming that the average tie contains 30 feet, board measure, the amount of timber represented by the white-oak ties is over one billion board feet, or approximately one-fourth of the total amount of oak lumber produced in one year, according to the Twelfth Census. Nearly all of the oak is converted into hewed ties, only 12.6 per cent being sawed.

Pine ranks next in importance with 23.5 per cent, and while it can not be definitely stated just what proportion should be assigned to the various species it is certain that more than three-fourths of the pine ties are southern yellow pine. The white and Norway pines should be credited with from 3 to 4 per cent and the western yellow pine of the

Rocky Mountain and Pacific Coast regions with from 17 to 18 per cent of the total number of pine ties. These estimates are deductions from Table 33, which shows the number of pine ties which come from each region. Cedar ranks third, with 8.9 per cent, followed closely by chestnut, with 6.1 per cent. Both of these species are excellent tie woods, and would figure more largely in the total production were it not for the limited distribution and supply of each. The percentage of the total number of hewed and sawed ties is, hewed, 77.4; sawed, 22.6.

Statistics are lacking for a comparison of the present output of ties with the number from each kind of timber in other years, but it is very probable that were they available it would be shown that the number and proportion of the pine ties have increased very materially within the last decade. Correspondingly, the proportion of oak ties would doubtless show a decrease for the same period.

The four leading kinds of timber for ties are oak, pine, cedar, and chestnut, which, combined, furnish 83 per cent of the total number, oak and pine alone furnishing 68 per cent. Next in rank is the red fir of the Pacific Coast and Rocky Mountain region, with 4.6 per cent, followed by the cypress of the South, with 4.5 per cent. The tamarack, or eastern larch of the New England and Lake States, and the eastern hemlock are the only other species credited with more than 1 per cent of the total number. Beech, birch, and maple were reported in amounts of less than one-tenth of 1 per cent each. The miscellaneous classification includes a number of woods, among which the most important are red gum, black locust, elm, hickory, and red cedar. Thus some twenty kinds of timber enter into the production of railroad ties, but of these only seven, at most, are important.

SUPPLY.

Until a comparatively short time ago the railroads were usually able to secure an ample supply of ties from lands adjacent to their rights of way. This has been especially true of the vast network of lines which traverse the territory east of the Mississippi River. While this source is by no means exhausted, it has become seriously depleted, and where in former years the purchasing agent could contract for an almost unlimited number of white-oak ties with the assurance that they would be promptly furnished, at the present time it is necessary to contract for small quantities and to anticipate the demand far in advance.

Wherever the whole tree is worked up into ties sawing permits of by far the closer utilization of material. From this it might be inferred that the present practice of hewing the majority of the ties is poor policy, judged from the standpoint of economy. As a matter of fact, however, little of the material which is converted into hewed ties is saw timber, consisting, as it does, of tops left from lumbering both conifers and hardwoods, or small trees from which, even though sawed, little, if any, additional tie stock could be secured, and heart timber full of knots, shake, and similar defects.

Where the tie was once the major product, it is now generally a minor product. The Pacific Coast is practically the only region in the United States where ties are produced as a major product of the forest. One of the most important sources of the ties in the East is the farmer's woodlot. During the winter in this region large numbers of ties are hewed and hauled to the railroads.

In determining the geographical distribution of the regions of supply, it was found impractical to attempt a classification by States on account of the manner in which the railroad companies furnished the information on this item. It was found possible, however, to determine the source, with a degree of certainty, by grouping the States as follows:

Region.	*States included.*
Southern	Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Arkansas, Texas, Indian Territory.
Central	Ohio, West Virginia, Kentucky, Tennessee, Indiana, Illinois, Missouri.
Lake	Michigan, Wisconsin, Minnesota.
North Atlantic	New England States, New York, Pennsylvania, New Jersey, Delaware, Maryland.
Pacific Coast	Washington, Oregon, California.
Rocky Mountain	Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico.

Table 34 shows, for the various regions, the number of hewed and sawed ties obtained from each kind of timber, arranged in order of importance. The regions are arranged from left to right according to the number of ties purchased.

TABLE 34.—*Source of supply of ties purchased by steam railroads of the United States in 1905.*

Kind of wood.	Regions.					
	Southern.		Central.		Lake.	
	Hewed.	Sawed.	Hewed.	Sawed.	Hewed.	Sawed.
Oak	11,406,130	570,806	14,554,592	2,966,758	240,824	101,823
Pine	10,197,766	4,182,193	10,400	18,600	641,941	2,420
Cedar	....	700	....	....	4,400,305	1,744,937
Chestnut	114,192	9,145	155,632	22,608	....	....
Douglas fir	....	....	....	....	....	....
Cypress	3,087,960	386,986	7,800	1,000	....	....
Tamarack	....	....	....	....	3,026,193	6,491
Hemlock	....	....	....	....	1,556,421	44,278
Redwood	....	....	....	....	....	....
Western larch	....	....	....	....	....	....
Spruce	....	....	....	....	....	....
Birch	25,000	....	500	....	....	....
Beech	2,500	....	2,000	1,500	....	2,000
Maple	25,000	....	....	500	....	....
Miscellaneous	15,237	3,460	15,781	11,199	40,935	5,519
Total	24,873,785	5,153,290	14,746,705	3,022,165	9,906,619	1,907,468
Per cent of all ties purchased in region	82.8	17.2	83.1	16.9	83.9	16.1
Total of hewed and sawed	30,027,075		17,768,870		11,814,087	
Per cent	38.5		22.8		15.1	

TABLE 34.—*Source of supply of ties purchased by steam railroads of the United States in 1905*—Continued.

Kind of wood.	Regions.						Total hewed and sawed.
	North Atlantic.		Pacific.		Rocky Mountain.		
	Hewed.	Sawed.	Hewed.	Sawed.	Hewed.	Sawed.	
Oak	4,094,952	741,419	....	....	....	....	34,677,304
Pine	3,137	2,000	....	1,254,125	946,191	1,092,264	18,351,037
Cedar	412,505	323,176	29,841	25,163	....	26,200	6,962,827
Chestnut	2,982,222	1,433,805	....	....	....	....	4,717,604
Douglas fir	....	....	216,696	2,190,581	1,193,519	32,840	3,633,276
Cypress	....	....	....	....	....	....	3,483,746
Tamarack	23,779	3,619	....	....	....	....	3,060,082
Hemlock	42,862	69,529	....	....	....	....	1,713,090
Redwood	....	....	500,904	89,948	....	....	590,852
Western larch	....	....	22,730	....	224,695	63,695	311,120
Spruce	....	....	....	....	60,190	87,978	148,168
Birch	....	10,000	....	....	....	....	35,500
Beech	1,520	24,707	....	....	....	....	34,227
Maple	....	....	....	....	....	....	25,500
Miscellaneous	115,989	18,774	....	10,000	....	....	236,894
Total	7,676,966	2,627,029	770,171	3,569,817	2,424,595	1,302,617	....
Per cent of all ties purchased in region	74.5	25.5	17.7	82.3	65.0	35.0	....
Total of hewed and sawed	10,303,995		4,339,988		3,727,212		77,981,227
Per cent	13.2		5.6		4.8		100.0

The Southern States rank first, furnishing over 38 per cent, while the Central States rank next with nearly 23 per cent of the total number of ties. These groups of States, which comprise practically all of the great hardwood forests of the country and all of the cypress and southern pine forests, furnish nearly two-thirds of the number of ties. The Lake States rank next with 15 per cent, followed closely by the North Atlantic with about 13 per cent. Thus it will be seen that practically 90 per cent of the ties are now obtained east of the Rocky Mountains. The Pacific Coast and Rocky Mountain regions, as yet, are not very important factors in the production of ties. This is explained by the fact that these regions at the present time probably do not supply tie material for much trackage beyond their limits, since the long haul to the eastern market makes it impossible for their ties to compete successfully with ties produced in the East.

The method of production in the Pacific Coast region, as compared with other regions, is brought out in a striking manner. It will be seen that the Pacific Coast is the only region in which more sawed than hewed ties are produced, 82.3 per cent being sawed. Practically the opposite condition is found in the Southern, Lake, and Central regions. The Rocky Mountain region follows next in proportion of sawed to hewed ties. Here, however, but 35 per cent are sawed. This condition is explained in part by the fact that timber is more plentiful and the stumpage value lower in the West than elsewhere; consequently the market for the lower grades of lumber is poor, and as there is always a ready market for ties, much of the lower grades is sawed into ties. Other factors also have an influence, the most important of which is the sparse population, which deprives the region of the supply obtained from farmers' woodlots, an important feature in the eastern tie market. While it is not to be expected, as with the production of lumber, that the Pacific Coast will ever become the chief source of supply for railroad ties, nevertheless the proportion will doubtless steadily increase.

PRESERVATION.

As a result of the realization that the supply of tie material was not limitless, and more especially when it was found that the durable white oak could no longer be secured in sufficient quantities to meet the demands for renewals and new track, an attempt was made to devise methods for increasing the length of service of the inferior woods. Tie plates were introduced with marked success in reducing the wear when used on soft woods. It was soon found, however, that the tie plate was not sufficient, since the wood decayed so rapidly that renewals in a short time were often necessary. To meet this problem, experiments in preservative treatments of ties were taken up by several railroad companies, some of them working in cooperation with the Forest Service, and it seems safe to predict that within a comparatively short period of time more treated than untreated ties will be used. The statistics for 1905 show that 7,510,000 ties, or nearly 10 per cent of the total number purchased, were given a preservative treatment of some character.

During 1905 at least ten railroad companies were operating their own plants for the preservation of their construction material, and several others are contemplating the installation of such plants. In addition to the roads which treat their own timber, many others have their timber treated at commercial treating plants.

WOOD USED FOR TIGHT COOPERAGE STOCK IN 1905.

By H. M. Hale, *Forest Assistant.*

In gathering these statistics on the annual production of tight cooperage stock the Forest Service was especially indebted to the Tight Barrel Stave Manufacturers' Association for assistance in securing complete reports. The figures given are based on statements from 220 manufacturers.

QUANTITY AND VALUE.

Table 35 shows that during the calendar year 1905 the total production of tight cooperage stock, consisting almost wholly of oak, amounted to 241,193,000 staves, with a value of $9,637,224, and 12,959,000 sets of heading, with a value of $3,366,740, making the total value $13,003,964. Expressed in board measure, the total amount of wood was approximately 350,000,000 feet. The quantity is more than 12 per cent of the total amount of oak cut into lumber during the previous year (1904), according to the preliminary report issued by the Bureau of the Census.

Table 35.—*Quantity and value of tight cooperage stock produced in 1905.*

STAVES.

	Number.	Per cent.	Value.
	Thousand.		
Sawed [a]	202,369	83.9	$7,132,460
Bucked and split	10,792	4.5	620,698
Hewed	10,396	4.3	800,325
Ale and beer	17,636	7.3	1,083,741
Total	241,193	100.0	9,637,224

HEADING.

	Sets.	Per cent.	Value.
	Thousand.		
Sawed [b]	11,023	85.1	$2,894,890
Beer	1,936	14.9	471,850
Total	12,959	100.0	3,366,740

[a] Includes 48,563,000 alcoholic staves, valued at $2,735,185.
[b] Includes 3,478,000 sets of alcoholic heading, valued at $1,501,000.

Statistics on the output of bucked and split stock are very difficult to secure, because so much of it is produced in very small quantities by farmers in the remote districts of the hardwood forest area, who keep no record. It is probable that the figures given for the total fall somewhat short of the actual amount.

PRODUCTION OF STAVES BY STATES.

Table 36 summarizes the production of staves by States and classes, arranged according to method of production. Four classes are distinguished—sawed, bucked and split, hewed, and beer stock. The importance of sawed staves is strikingly shown by the fact that they constitute 83.9 per cent of the total number. Beer stock ranks next, with 7.3 per cent, followed by bucked and split stock, with 4.5 per cent, and hewed stock, with 4.3 per cent. Kentucky leads in the production of sawed staves and beer stock, furnishing 23.3 per cent of the former and 68.8 per cent of the latter. Louisiana, with 25.9 per cent of the bucked and split stock and 71 per cent of the hewed stock, holds first place in the production of these staves.

Hewed staves are manufactured chiefly for the foreign market, and most of the work is done by expert foreign laborers, who, by their special skill and knowledge of the requirements of foreign trade, do most satisfactory work. The process of manufacture is a simple one, since the work is done almost entirely by hand. Clear, straight-grained trees are absolutely essential for the production of straight staves of uniform thickness, and before the cylinder saw had been perfected all staves were manufactured by hand, and only the choicest oak could be used. More recently, since material of high quality has become more difficult to obtain and the demand for tight cooperage stock has greatly increased, the cylinder saw has been resorted to in order to use large quantities of timber which it was impossible to utilize for staves by the old method.

Table 36.—*Production of tight barrel staves in 1905, by States.*

[Quantities expressed in thousands.]

States.	Total.		Sawed.		Bucked and split.		Hewed.		Beer and ale.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Alabama	5,955	2.5	5,893	2.9	59	0.6	3	......	......	......
Arkansas	23,939	9.9	21,192	10.4	1,930	17.9	......	......	817	4.6
Illinois	8,459	3.5	7,756	3.8	......	......	3	......	700	4.0
Indiana	8,800	3.7	7,500	3.7	1,300	12.0	......	......	......	......
Kentucky	61,270	25.3	46,980	23.3	2,137	19.8	43	0.4	12,110	68.8
Louisiana	15,095	6.3	4,506	2.2	2,800	25.9	7,384	71.0	405	2.3
Michigan	1,325	.6	1,325	.6	......	......	......	......	......	......
Mississippi	6,798	2.8	4,381	2.2	1,119	10.4	1,298	12.5	......	......
Missouri	26,993	11.2	24,871	12.3	590	5.5	......	......	1,532	8.6
New York	1,191	.5	1,050	.5	40	.4	70	.7	31	.2
Ohio	12,712	5.2	12,712	6.3	......	......	......	......	......	......
Pennsylvania	2,704	1.1	2,561	1.3	......	......	......	......	143	.8
Tennessee	37,468	15.6	35,093	17.4	......	......	1,575	15.2	800	4.5
Texas	3,451	1.4	2,968	1.5	230	2.1	20	.2	233	1.3
Virginia	2,045	.9	1,495	.7	500	4.6	......	......	50	.3
West Virginia	11,353	4.7	11,353	5.6	......	......	......	......	......	......
Wisconsin	745	.3	......	......	......	......	......	......	745	4.2
All others	10,890	4.5	10,733	5.3	87	.8	......	......	70	.4
Total	241,193	100.0	202,369	100.0	10,792	100.0	10,396	100.0	17,636	100.0
Per cent of total	100		83.9		4.5		4.3		7.3	

SAWED STAVES.

Table 37 shows the number of sawed staves of the different grades produced during the year, together with their value according to average quotations on the Chicago market. The spot value may be fairly well estimated for any point by deducting the transportation charges from point of shipment.

One of the interesting points brought out in this table is the percentage of alcoholic stock which oak forests are now yielding. The bourbon and the spirit and wine staves combined make 24 per cent of all staves. The value per thousand of alcoholic stock is nearly double that of any other grade, so that the production is probably kept at a maximum, and since only the choicest white oak is suitable, the proportion of alcoholic stock must diminish as the forest loses in quality.

Oil and tierce sawed staves comprise 51 per cent of all sawed staves if white oak alone is considered and more than 55 per cent if red oak is also included. They rank first in total value also. Red oak has been used for tight cooperage only a few years. It appears to have proved only fairly satisfactory, since it comprises but 3.8 per cent of the total amount and sells for less than white oak.

TABLE 37.—*Quantity and value of sawed staves produced in 1905.*

Grade.	Timber.	Number.	Per cent.	Price per M.	Value.
		Thousand.			
Oil and tierce	White oak	104,067	51.3	$32	$3,330,144
Spirit and wine	do	28,094	13.9	50	1,404,700
Bourbon	do	20,460	10.1	65	1,330,485
Oil and tierce	Red oak	7,737	3.8	30	232,110
Pork	White oak	6,860	3.4	24	164,640
Half barrel	do	3,821	1.8	39	149,019
Cut-offs	Red oak and white oak	16,770	8.4	12	201,240
All others	Miscellaneous	14,551	7.3	22	320,122
Total		202,369	100.0		7,132,460

It is important to note the extent to which other woods have been substituted for white oak in tight cooperage. By combining the miscellaneous woods with the red oak it appears that 11 per cent of the sawed staves are produced from other species than white oak.

Under the heading "All others" are included a variety of grades, chiefly sirup, glucose, lead, and fish package staves. These are made from several kinds of timber, of which the principal ones are red gum, white pine, cypress, and ash. Altogether they furnished 7.3 per cent of the total.

BUCKED AND SPLIT STAVES.

Table 38 gives the quantity and value of the bucked and split staves, exclusive of beer stock. This stock, used almost entirely for making packages to contain alcoholic liquors, is the highest grade which it is possible to produce. A large proportion of it is exported, although much of it finds its way to California to be used for eastern shipments of wine. Bourbon staves constitute nearly one-half of the total number.

TABLE 38.—*Quantity ana value of bucked and split staves produced in 1905.*

Grade.	Number.	Per cent.	Price per M.	Value.
	Thousand.			
Bourbon	5,020	46.5	$65	$326,300
West Indian	1,966	18.2	70	137,620
Spirit and wine	1,882	17.4	52	97,864
Seconds	1,538	14.3	30	46,140
Half barrel	291	2.7	39	11,349
Cut-offs	95	.9	15	1,425
Total	10,792	100.0	....	620,698

Though statistics are wanting to show it, the fact is well known that the production of split staves has decreased very rapidly within a comparatively few years, owing to the steady increase in the value of white-oak timber, which has resulted in the perfecting of the stave saw and the improvement of manufacturing methods generally.

HEWED STAVES.

Table 39 gives the quantity and value of hewed stock. The French claret stave constitutes practically the whole of this class of stock, which is primarily an export grade. The values have been obtained by using average New Orleans quotations for 1905.

TABLE 39.—*Quantity and value of hewed staves produced in 1905.*

Grade.	Number.	Per cent.	Price per M.	Value.
	Thousand.			
French claret	10,193	98.1	$75	$764,475
Pipe	95	.9	150	14,250
All others	108	1.0	200	21,600
Total	10,396	100.0	....	800,325

HEADING.

Table 40 shows the quantity and value of the heading. The values given represent, approximately, the average Chicago market.

TABLE 40.—*Quantity and value of sawed heading produced in 1905.*

Grade.	Number of sets.	Per cent.	Price per set.	Value.
	Thousand			
Oil and tierce	[a]5,707	51.9	$0.20	$1,097,200
Bourbon	1,897	17.2	.50	948,500
Spirit and wine	1,581	14.3	.35	553,350
Half barrel and keg	1,152	10.4	.16	184,320
Pork	208	1.9	.18	37,440
All others	478	4.3	.16	74,080
Total	11,023	100.0	.26	2,894,890

[a] Includes 221 thousand sets of red oak.

ALE AND BEER STOCK.

Table 41 shows the quantity and value of the staves and heading produced for beer and ale packages. One reason for the small percentage of barrel stock is that timber suitable for manufacture into these large staves is becoming scarce, or at least difficult to obtain.

TABLE 41.—*Quantity and value of beer and ale stock produced in 1905.*

STAVES.

Size.	Number.	Per cent.	Value.
	Thousand.		
Barrel	1,178	6.7	$123,690
Half barrel	6,123	34.8	397,995
Quarter barrel	7,380	41.9	383,760
Eighth barrel	2,333	13.2	74,656
Ale barrel	96	.5	12,960
Ale half barrel	50	.2	5,000
Ale and beer hogshead	476	2.7	85,680
Total	17,636	100.0	1,083,741

HEADING.

Size.	Number.	Per cent.	Value.
Barrel	307	15.8	$153,500
Half barrel	543	28.1	135,750
Quarter barrel	740	38.2	148,000
Eighth barrel	346	17.9	34,600
Total	1,936	100.0	471,850

An industry more completely dependent upon one species of timber than is tight cooperage would be difficult to find. Tight cooperage depends upon white oak, and white oak of good quality. A single defect in a stave or head may cause the loss of the contents of the entire package. For alcoholic liquors only the best white oak will serve. Stock of this grade is always in demand and commands the highest price. In quantity, oil and tierce cooperage ranks first, but since this grade is very largely made from timber which will not make alcoholic stock it can in one sense be termed a second grade, though this refers to the sawed staves.

PRODUCTION OF STAVES BY STATES.

Table 42 gives detailed statistics of the production of tight-barrel staves by States. The tabulation indicates very clearly the region in which the industry is centered. This, as might be expected, is the heart of the great hardwood forests, and includes the States of Kentucky, Tennessee, Missouri, and Arkansas, which together furnish 62 per cent of the total number of staves. The 9 9 per cent credited to Arkansas is probably less than the actual amount, because companies, though operating in Arkansas, frequently reported production as from Tennessee or Kentucky, where the home office and original plants are located. The same is true of Mississippi, credited with but 8 firms and 2.8 per cent of the total production, where fewer mills are operated than in Arkansas, but where large quantities of timber are worked into bolts and shipped to Tennessee mills to be converted into the finished product.

TABLE 42.—*Production of tight barrel staves, by classes and States, 1905.*

[Quantities expressed in thousands.]

States.	Total.			Sawed staves.						
	Number of firms.	Number.	Per cent.	Oil and tierce.	Spirit and wine.	Bourbon.	Pork.	Half barrel.	Cut-offs.	Miscellaneous.
Alabama	5	5,955	2.5	4,856	228	146	75	28	560	....
Arkansas	18	23,939	9.9	13,087	5,363	618	200	218	1,694	12
Illinois	4	8,459	3.5	5,433	1,521	....	113	43	646	....
Indiana	4	8,800	3.7	2,700	800	3,000	500	200	300	....
Kentucky	40	61,270	25.3	24,482	6,100	10,550	654	663	3,325	1,206
Louisiana	9	15,095	6.3	2,054	957	886	122	85	402	....
Michigan	3	1,325	.6	780	....	....	480	....	65	....
Mississippi	8	6,798	2.8	3,210	440	277	104	....	350	....
Missouri	8	26,993	11.2	11,893	7,729	....	242	850	4,157	....
New York	3	1,191	.5	....	750	....	....	300	....	....
Ohio	4	12,712	5.2	12,712	....	....	....	....	....	....
Pennsylvania	3	2,704	1.1	2,200	111	....	....	50	200	....
Tennessee	22	37,468	15.6	18,493	3,895	1,190	3,750	1,324	3,708	2,733
Texas	3	3,451	1.4	606	200	1,852	200	60	50	....
Virginia	3	2,045	.9	....	....	1,150	345	....	....	....
West Virginia	8	11,353	4.7	9,165	....	800	75	....	1,313	....
Wisconsin	3	745	.3	....	....	....	....	....	....	....
All other	5	10,890	4.5	133	....	....	....	....	....	10,600
Total	153	241,193	100.0	111,804	28,094	20,469	6,860	3,821	16,770	14,551

States.	Bucked and split staves.						Hewed staves.		
	Bourbon.	West Indian.	Spirit and wine.	Seconds.	Half barrel.	Cut-offs.	French claret.	Pipe.	All other.
Alabama	14	30	2	13	....	....	3	....	....
Arkansas	306	239	728	482	175	....	....	....	....
Illinois	....	....	....	....	....	....	3	....	....
Indiana	1,000	....	....	200	50	50	....	....	....
Kentucky	1,445	125	65	440	17	45	....	25	18
Louisiana	1,100	890	710	100	....	....	7,314	....	70
Mississippi	909	5	....	205	....	....	1,298	....	....
Missouri	246	....	197	98	49	....	....	....	....
New York	....	40	....	....	....	....	....	70	....
Tennessee	....	....	....	....	....	....	1,575	....	....
Texas	....	50	180	....	....	....	....	....	20
Virginia	....	500	....	....	....	....	....	....	....
All other	....	87	....	....	....	....	....	....	....
Total	5,020	1,966	1,882	1,538	291	95	10,193	95	108

States.	Beer staves.						
	Barrel.	Half barrel.	Quarter barrel.	Eighth barrel.	Ale barrel.	Ale half barrel.	Ale and beer hogshead.
Arkansas	152	245	335	85	....	....	....
Illinois	....	100	500	100	....	....	....
Kentucky	576	4,561	4,870	1,602	86	50	365
Louisiana	30	150	125	80	10	....	10
Missouri	103	390	745	261	....	....	33
New York	31	....	....	....	....	....	....
Pennsylvania	11	8	24	100	....	....	....
Tennessee	....	350	400	50	....	....	....
Texas	100	65	....	....	....	....	68
Virginia	....	50	....	....	....	....	....
Wisconsin	120	189	381	55	....	....	....
All other	55	15	....	....	....	....	....
Total	1,178	6,123	7,380	2,333	96	50	476

Kentucky, Tennessee, Missouri, and Arkansas rank first in the production of sawed staves, and Indiana, Kentucky, and Louisiana in the production of bucked and split staves. Only ten States participate in the production of the latter class of stock, and of these Tennessee, Mississippi, and Louisiana also furnish practically all of the hewed staves.

Beer staves have not been listed under "bucked or split," where they would otherwise belong, because of the distinct character of the stock. Though attempts have been made to manufacture beer stock on the cylinder saw, results have not been entirely satisfactory, and by far the larger part of it is still produced, as formerly, by splitting. The table indicates that Kentucky furnishes fully 50 per cent of the total amount; but much of the stock reported from Kentucky was, in fact, produced in other States by companies having their home offices in Kentucky, so that the total figure for Kentucky is too high. There is good reason to believe that Tennessee produces nearly as much as Kentucky. The statistics on the distribution of the production for this class of stock are far from satisfactory, because so much of it is manufactured by small operators and sold to a few large operators and dealers who were unable to report the sources of their supply.

PRODUCTION OF HEADING BY STATES.

Table 43 indicates the distribution of the production of tight barrel heading. Since heading requires the same kind of timber as staves, it is not surprising to find the bulk of the production in practically the same region. Kentucky leads all others, furnishing more than 30 per cent, followed by Tennessee, Missouri, Illinois, and Arkansas. Though 67 firms engaged in the manufacture of heading in 1905, the bulk of the stock was produced by comparatively few firms, less than one-fourth of the total number. During 1904 the statistics gathered by the Tight Barrel Heading Manufacturers' Association, which includes some twelve or fifteen manufacturers only, showed that their combined production amounted to over 8,000,000 sets, or approximately 61.5 per cent of the total amount reported for 1905. The amount of split heading was so small that it was not tabulated separately, but included under "Sawed heading." As in the case of beer staves, beer heading has been tabulated separately.

Table 43.—*Production of tight barrel heading, by classes and States, 1905.*

[Quantities expressed in thousands.]

States.	Number of sets.	Per cent.	Sawed heading.						Beer heading.			
			Oil and tierce.	Bourbon.	Spirit and wine.	Half barrel and keg.	Pork.	All other miscellaneous.	Barrel.	Half barrel.	Fourth barrel.	Eighth barrel.
Alabama	3	(a)	1	......	......	2	......	......	......	......	......	......
Arkansas	958	7.4	509	36	33	11	......	15	43	126	145	40
Illinois	1,256	9.7	843	32	173	28	......	180	......	......	......	......
Indiana	220	1.7	80	60	20	35	25	......	......	......	......	......
Kentucky	4,029	31.2	1,024	1,087	350	290	48	29	159	262	528	252
Louisiana	80	.6	45	......	35	......	......	......	......	......	......	......
Michigan	178	1.3	39	......	......	4	135	......	......	......	......	......
Mississippi	35	.3	......	26	4	5	......	......	......	......	......	......
Missouri	1,549	11.9	986	18	343	189	......	......	1	10	......	2
New York	400	3.1	......	......	......	400	......	......	......	......	......	......
Ohio	839	6.5	839	......	......	......	......	......	......	......	......	......
Oregon	10	.1	......	......	......	......	......	......	......	......	......	10
Pennsylvania	113	.9	45	......	8	......	......	......	4	4	12	40
South Carolina	1	(a)	1	......	......	......	......	......	......	......	......	......
Tennessee	2,323	17.9	1,195	363	565	188	......	......	......	5	5	2
Texas	66	.5	......	......	......	......	......	......	20	46	......	......
West Virginia	425	3.3	100	275	50	......	......	......	......	......	......	......
Wisconsin	220	1.7	......	......	......	......	......	......	80	90	50	......
All other	254	1.9	......	......	......	......	......	254	......	......	......	......
Total[b]	12,959	100.0	5,707	1,897	1,581	1,152	208	478	307	543	740	346

[a] Less than one-tenth of 1 per cent.

[b] Number of firms, 67.

WOOD USED FOR PULP IN 1905.

By H. M. Hale, *Forest Assistant.*

The following tables of the quantity and value of wood used for pulp are compiled from reports made direct to the Forest Service by wood-pulp manufacturers. Acknowledgment is made to these manufacturers for their cordial and efficient cooperation. The number who neglected to report is less than 5 per cent.

The amount of wood used for pulp is small in comparison to the total lumber production, being about 4 per cent of the annual production of lumber, and 3 per cent of the value. Yet the wood-pulp industry is of much importance and has developed rapidly. According to the census of 1900 there was during the decade 1890–1900 an increase of more than 17 per cent in the number of establishments and of more than 86 per cent in the capital invested. The figures apply to pulp and paper mills combined, but it is safe to assume that the ratio of increase holds good if applied to pulp mills alone. A preliminary bulletin recently issued by the Bureau of the Census shows that from 1899 to 1904 there was no increase in the number of establishments, but that the capital invested increased 66 per cent during that time.

AMOUNT AND VALUE OF WOOD USED.

A review of the statistics of the pulp industry as given by the reports of the Bureau of the Census for the years 1899 and 1904 shows an increase of 53.3 per cent in the amount of wood used, the exact figures being 1,986,310 cords in 1899, and 3,043,459 cords in 1904. In the present report the amount of wood used in 1905 as compared with 1904 shows an increase of 4.6 per cent. The totals given in Table 44 show that 164 companies operating 237 mills used 3,192,223 cords of wood in 1905, which produced 4,168,964,000 pounds, or 2,084,482 tons of pulp. Statements by manufacturers indicate that the average amount of pulp produced from a cord of wood by the various processes is as follows: Mechanical 2,372 pounds, soda 1,033 pounds, and sulphite 1,009 pounds. The estimate of the quantity of pulp is not wholly satisfactory, since some companies reported dry pulp and others reported pulp containing various amounts of water. Averaging all processes the figures given show a production of 1,300 pounds of pulp per cord of wood.

It has been found impossible to make an accurate comparison of the number of establishments using pulp wood in 1904 and 1905, because the reports of the Bureau of the Census do not differentiate between pulp mills and paper mills. The total number of mills engaged in the manufacture of pulp or paper, or both, in 1904 was 759. In 1905 the number of mills engaged in the manufacture of both pulp and paper was 117, and the number engaged in the manufacture of pulp alone was 120, making the total number of mills manufacturing pulp 237.

Table 44.—*Wood used and pulp produced in 1905.*

State.	Companies.	Wood used.		Pulp produced.
		Amount.	Value.	
	Number.	*Cords.*		*1,000 pounds.*
New York	60	1,301,986	$8,137,412	1,954,626
Maine	18	501,807	2,950,625	646,024
Wisconsin	30	382,471	1,686,697	481,314
New Hampshire	6	233,700	1,257,306	257,795
Pennsylvania	11	250,826	1,158,816	246,744
Michigan	8	109,764	475,278	126,551
West Virginia	4	96,357	497,202	99,713
Virginia	3	89,540	492,470	89,299
Ohio	3	54,000	274,320	58,100
Minnesota	3	31,802	121,801	49,484
Vermont	7	22,271	122,490	40,415
Massachusetts	4	34,362	171,810	33,989
All other [a]	7	83,337	389,438	84,910
Total	[b] 164	3,192,223	17,735,665	4,168,964

[a] One mill each in Delaware, Maryland, Washington, California, Colorado, Texas, South Carolina.
[b] Operating 237 mills.

SPECIES AND PROCESSES.

Spruce is the wood most used for pulp, furnishing more than 70 per cent of the total amount. Table 45 gives statistics of species and processes. The processes, broadly speaking, are two—mechanical and chemical. There are, however, two chemical processes, sulphite and soda, so called because they use sulphurous acid and caustic soda, respectively, in reducing the wood.

Table 45.—*Kinds and amounts of wood manufactured into pulp by various processes.*

Kind.	Process.								Per cent.
	Mechanical.		Sulphite.		Soda.		Total.		
Spruce:	*Cords.*		*Cords.*		*Cords.*		*Cords.*		
Domestic	794,260		784,674		71,775		1,650,709		
Imported	230,289		392,256		....		622,545		
		1,024,549		1,176,930		71,775		2,273,254	71.2
Poplar:									
Domestic	8,592		....		290,583		299,175		
Imported	2,800		....		20,083		22,883		
		11,392		....		310,666		322,058	10.1
Hemlock		30,843		344,579		....		375,422	11.8
Pine		14,432		18,600		24,367		57,399	1.8
Balsam		10,801		45,943		....		56,744	1.8
Cottonwood		....		....		10,507		10,507	.3
All other		4,777		44,341		47,621		96,739	3.0
		1,096,794		1,630,393		464,936		3,192,222	100.0

The greater portion of the spruce is reduced by the sulphite process. Cottonwood and poplar are reduced almost entirely by the soda process. Next to spruce and poplar, hemlock is most used. It has sprung into favor in a comparatively short time, and is reduced chiefly by the sulphite process. Pine is reduced by all processes. Balsam, a wood scarcely considered for pulp in 1899, is now widely used, mainly in conjunction with spruce. While it furnishes less than 2 per cent of the total amount of wood used for pulp, it is practically as important as pine and would furnish a much larger quantity were it not for the limited supply.

The totals for all processes show that more wood was reduced by the sulphite process in 1905 than by all other processes combined. The respective proportions are: Sulphite, 51 per cent; mechanical, 34 per cent; soda, 15 per cent.

TABLE 46.—*Comparison of total amounts of wood used for pulp in 1999 and 1905.*

Process.	1899.	1905.	Increase.	
	Cords.	*Cords.*	*Cords.*	*Per cent.*
Mechanical	786,840	1,096,804	309,964	39.4
Chemical	1,199,470	2,095,419	895,949	74.7
Total	1,986,310	3,192,223	1,205,913	60.7

Table 46 compares the amount of wood used for pulp in 1899, as given by the Twelfth Census, with the amount reported to the Forest Service for 1905. This shows that during these six years there was an increase of 60.7 per cent in the total amount of wood used. The rate of increase was much greater with the chemical process, as there was a gain of 74.7 per cent in the amount of wood used for chemical reduction, against an increase of 39.4 per cent in the quantity of wood used for mechanical reduction.

IMPORTED WOOD.

The increasing demand for spruce has made a consequent demand by American manufacturers upon the Canadian spruce forests. This is strikingly shown in Table 47, which indicates that the importations have increased about 75 per cent in the last six years, while spruce, which constitutes the bulk of the imported woods, increased 83 per cent.

TABLE 47.—*Comparison of wood imported from Canada for pulp in 1899 and 1905.*

Kind.	1899.	1905.	Increase.	
	Cords.	*Cords.*	*Cords.*	*Per cent.*
Spruce	349,084	622,545	293,461	82.9
Poplar	20,133	22,883	2,750	13.6
Total	369,217	645,428	276,211	74.8

PRODUCTION BY STATES.

As shown by Table 44, New York leads all states in number of companies, cords of wood used, and pounds of pulp produced. Of the total number of companies (164) producing pulp, New York has 60, or more than one-third; of wood used, New York takes over one-third of all and more than twice as much as her nearest competitor, Maine; of pulp produced New York furnishes one-third, and three times as much as Maine. New York's annual consumption of wood is more than 1,300,000 cords; Maine's about 500,000 cords. Wisconsin, New Hampshire, Pennsylvania, and Michigan follow in the order named. These six States consume the bulk of the wood and have 133 of the 164 companies.

Table 48 carries the State production further than Table 44, and shows species and totals by processes.

TABLE 48.—*Woods used in the production of pulp in 1905, by species, States, and processes.*

MECHANICAL PROCESS.

State.	Spruce.		Poplar.		Balsam	Hemlock.	Pine.	Miscellaneous.
	Domestic.	Imported.	Domestic.	Imported.				
	Cords.	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*
New York	450,639	194,789	2,334	....	4,610	3,230	1,396	50
Maine	113,518	13,066	1,883	....	1,442	113	843	....
Wisconsin	150,763	16,500	2,952	....	850	....	4,552	227
New Hampshire	8,769	....	....	....	....	....	....	....
Pennsylvania	4,200	....	....	....	....	26,000	....	....
Michigan	6,077	100	450	2,800	65	500	741	....
West Virginia	8,351	....	....	....	....	....	....	....
Virginia	....	....	....	....	....	....	....	4,500
Ohio	6,000	1,000	....	....	....	1,000	500	....
Minnesota	30,302	....	....	....	....	....	....	....
Vermont	13,422	4,834	373	....	3,642	....	....	....
Massachusetts	2,000	....	600	....	200	....	....	....
All other	....	....	....	....	....	....	6,400	....
Total	794,260	230,289	8,592	2,800	10,801	30,843	14,432	4,777

SULPHITE PROCESS.

State.	Spruce.		Pine.	Hemlock.	Balsam.	Miscellaneous.
	Domestic.	Imported.				
	Cords.	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*
New York	321,508	200,335	....	26,161	17,557	....
Maine	197,200	14,644	....	....	....	....
Wisconsin	49,394	....	....	154,847	2,386	....
New Hampshire	74,431	142,000	....	500	8,000	....
Pennsylvania	7,815	11,048	....	64,692	18,000	20,000
Michigan	10,500	17,975	....	70,215	....	341
West Virginia	40,532	....	....	11,664	....	....
Virginia	59,040	....	....	....	....	....
Ohio	....	....	....	16,500	....	24,000
Minnesota	1,500	....	....	....	....	....
Massachusetts	22,004	6,254	....	....	....	....
All other	750	....	18,600	....	....	....
Total	784,674	392,256	18,600	344,579	45,943	44,341

TABLE 48.—*Woods used in the production of pulp in 1905, etc.*—Continued.

SODA PROCESS.

State.	Spruce.		Poplar.		Pine.	Cottonwood.	Miscellaneous.
	Domestic.	Imported.	Domestic.	Imported.			
	Cords.	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*	*Cords.*
New York	41,455	....	25,631	12,291	....	....	....
Maine	28,517	....	123,081	7,500	....	....	....
Wisconsin	....	....	....	....	....	....	....
New Hampshire	....	....	....	....	....	....	....
Pennsylvania	....	....	36,714	....	24,367	....	37,990
Michigan	....	....	....	....	....	....	....
West Virginia	....	....	30,645	....	....	....	5,165
Virginia	....	....	26,000	....	....	....	....
Ohio	....	....	3,000	....	....	2,000	....
Minnesota	....	....	....	....	....	....	....
Vermont	....	....	....	....	....	....	....
Massachusetts	....	....	3,012	292	....	....	....
All other	1,803	....	42,500	....	....	8,597	4,466
Total	71,775	....	290,583	20,083	24,367	10,597	47,621

GENERAL INFORMATION.

Miscellaneous information of general interest is given in Table 49. The table shows the average daily output of pulp for the mills of each State as reported by the manufacturers. A comparison of these figures with the total amount of pulp manufactured and the number of mills operating for the time given discloses the fact that they are uniformly too large. It is likely, therefore, that the figures submitted by the manufacturers represent more nearly the maximum daily capacity than the average daily output.

TABLE 49.—*General information on the pulpwood industry.*

State.	Number of companies reporting.	Average months operated.	Claimed average daily output.	Number of companies using the different processes.					Number of companies—								Average value per cord of wood at timber camps.	Estimated length of supply.
				Sulphite.	Soda.	Mechanical.	Sulphite and soda.	Sulphite and mechanical.	Receiving peeled wood.	Receiving rossed wood.	Using slabs.	Carrying on logging operations.	Importing wood from other States or from Canada. All.	Importing wood from other States or from Canada. Prt.	Making both paper and pulp.			
		No.	*Pounds.*													*P.ct.*		*Yrs.*
New York	60	12	86,900	5	1	43	1	10	55	55	48	49	....	21	40	67	$6.25	19
Maine	18	12	120,900	8	2	5	....	3	14	13	15	14	....	2	12	67	5.88	15
Wisconsin	30	11	54,200	5	...	17	....	7	22	22	22	22	1	19	16	53	4.41	13
New Hampshire	6	12	119,900	3	...	3	....	....	7	7	6	6	....	2	4	67	5.38	28
Pennsylvania	11	12	79,800	2	6	....	....	1	10	10	10	10	1	6	11	100	4.62	15
Michigan	8	12	41,225	5	...	3	....	....	8	6	8	7	....	3	7	88	4.33	20
West Virginia	4	12	68,600	1	...	2	1	....	4	4	4	5	....	....	3	75	5.16	23
Virginia	3	12	101,900	1	1	....	....	1	3	3	3	3	1	1	3	100	5.50	15
Ohio	3	12	49,300	1	1	1	....	1	3	3	4	4	1	2	3	100	5.08	.....
Minnesota	3	12	54,300	...	...	3	....	....	3	3	3	3	....	....	3	100	3.83	.....
Vermont	7	11	24,600	...	...	7	....	....	7	7	6	7	....	2	4	57	5.50	30
Massachusetts	4	12	31,000	2	...	2	....	....	4	3	3	3	1	2	3	75	5.00	25
All others	7	10	46,000	1	3	....	....	3	4	5	6	6	....	....	7	100	4.25	30
Total	164	....	....	34	14	86	2	26	144	141	138	139	5	60	116	....	.....	.....
Average	....	11.7	69,125	...	...	....	....	....	....	....	....	....	....	....	....	70.7	5.01	21

The utilization of slabs for pulp appears to have become quite common, 138 establishments reporting their use. The percentage which slabs form of the total amount of wood, however, is small, since they rarely constitute over 10 per cent of the total amount of wood used by a single mill.

Of the 164 companies reporting, 139, or approximately 85 per cent, carry on logging operations, which may also be taken to indicate that they own or control timber land. Only five companies depend wholly upon other States or Canada for their supply.

The price of wood at the point of shipment—in other words, f. o. b. cars or on the banks of a stream—was an item upon which there was surprising diversity among the firms reporting; the figures in a State often varying from $2 to $10 per cord. In the compilation extreme cases were disregarded, as it was evident that the price given would in some cases no more than cover the actual cost of cutting and driving or hauling, while on the other hand the maximum prices submitted evidently included transportation to the mill. Of the States named, the two Lake States, Minnesota and Wisconsin, are credited with the cheapest raw material, $3.83 and $4.41 per cord, respectively, while in New York the average price is $6.25 per cord. The average price per cord of all is $5.55.

Estimates of the length of time which the supply of timber will last were very consistent within States, and the consensus of opinion is to be found in the averages given in Table 49.

The extent to which the manufacture of paper is combined with the manufacture of pulp is demonstrated in the last section of the table, where it will be noted that the percentage of the mills making both paper and pulp is very high, and, in several instances, all the mills in a State make both.

One of the interesting features brought out by the returns is the sawmill waste and the different kinds of wood now being made into pulp. Among these were noted pitch, jack, and southern pines, maple, birch, beech, white fir, and some of the pines of the Pacific coast. Of sawmill waste, sawdust and veneer cores were mentioned. It is probable that other woods and waste materials may be used for pulp, and the Forest Service has established a laboratory to investigate these possibilities.

TIMBER USED IN THE MINES OF THE UNITED STATES IN 1905.

By R. S. KELLOGG, *Forest Inspector.*

These statistics on the timber used in the mines of the United States in 1905 are based upon data gathered by the Forest Service in cooperation with the U. S. Geological Survey. The Geological Survey gives the number of mines as over 50,000. This includes, however, all excavations for the purpose of securing mineral products of any kind. In quarrying operations, placer mines, coal "strippings," and clay pits, though they fall in this class, no timber is used; nor is any used by oil and gas wells, or salt works where salt is made from brine. There are also many small mines of other sorts, particularly in the West, in which timber is unnecessary. Nearly 14,000 mines were selected in which the use of timber seemed certain or possible, and from more than 5,000 of these, reports were received showing that timber had been used. Nearly 9,000 mines reported no use of timber, and a small number of operators failed to report. It is probable that the resulting figures cover fully 90 per cent of the total amount of timber used during the year.

The operators were requested to report only the timber used underground, but it is probable that in some cases they failed to distinguish between timber for surface and underground use.

The reports were of such a character that in many cases the kind of wood used could not be determined. This accounts for the large items in the tables under the heading "Mixed" or "Not specified." On the other hand, it was possible in all cases to separate the material into round and sawed timber. The cost given for the timber represents the cost delivered at the mine. This is an extremely variable figure, since many operators cut their timber very near their mines and include in estimating its cost only the labor required to cut it.

Table 50 gives the kinds and the total quantity of timber used. The total amount reported was 165,535,900 cubic feet of round timber and 435,944,000 board feet of sawed timber. Reducing the sawed timber to cubic feet and combining with the round timber gives a total of over 200,000,000 cubic feet. Very little of the round timber was of such dimensions as to make possible its manufacture into sawed lumber; however, its total volume is equivalent to 1,986,430,800 board feet, which, added to the amount of sawed timber, makes a grand total of 2,422,374,800 board feet. Of the various kinds of timber used, it will be noted that pine constitutes half of the softwood round timber and about one-third of the softwood sawed timber. Fir and hemlock are next in importance in nearly equal quantities. Of the hardwoods, oak, including over 28 million cubic feet of round timber and over 58 million board feet of sawed timber, has by far the greatest use in both forms. A great deal of oak is doubtless included also in the "Mixed hardwoods" and "Not specified" items.

TABLE 50.—*Kind and quantity of timber used in 5,163 mines in 1905.*

Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*
Pine	19,100,000	96,602,000
Fir	4,360,000	78,772,000
Hemlock	4,155,800	60,802,000
Spruce	1,104,200	5,403,000
Mixed softwoods	9,685,600	32,166,000
Total softwoods	38,405,600	273,745,000
Oak	28,174,400	58,693,000
Chestnut	1,543,800	908,000
Beech	522,900	1,597,000
Aspen	142,100	....
Maple	136,600	5,973,000
Elm	117,200	932,000
Hickory	94,400	....
Poplar	....	475,000
Mixed hardwoods	54,915,100	60,333,000
Total hardwoods	85,646,500	128,911,000
Not specified	41,483,800	33,288,000
Grand total	165,535,900	435,944,000

Table 51 gives the total quantity and cost of the timber by classes of mines. The cost of the round timber was over $9,000,000, and that of the sawed timber was over $7,000,000, giving a total of over $16,000,000. It will be noted that 2,940 bituminous coal mines used nearly $6,400,000 worth of timber, while 216 anthracite coal mines used over $4,400,000 worth, the average cost of timber per mine being $2,170 for the bituminous and $20,524 for the anthracite mines.

It will also be noted that the timber used in the 216 anthracite mines was of slightly greater value than that used in 1,718 mines for precious metals, the average cost per mine in the latter case being $2,564. Many of the precious-metal mines are rather small, and are also in such solid rock that often little or no supporting timber is necessary. Timbering for iron mines is rather expensive, the average cost per mine for 143 mines being $6,395. In the miscellaneous class, which includes copper and other minerals, the average cost per mine for timber for 146 mines was $2,210, and 484 mines reported that no timber was used.

TABLE 51.—*Quantity and cost of timber used in mines in 1905.*

Mineral product.	Number of mines.	Round timber.		Sawed timber.		Total cost.	Average cost per mine.
		Cubic feet.	Cost.	Board feet.	Cost.		
Bituminous coal	2,940	91,309,700	$4,165,926	140,790,000	$2,214,005	$6,379,931	$2,170
Anthracite coal	216	43,676,000	2,898,063	101,210,000	1,535,062	4,433,125	20,524
Precious metals	1,718	15,282,500	1,340,808	164,956,000	3.064,882	4,405,690	2,564
Iron	143	13,484,000	728,350	13,929,000	186,099	914,449	6,395
Miscellaneous	146	1,783,700	118,917	15,059,000	203,775	322,692	2,210
Total	5,163	165,535,900	9,252,064	435,944,000	7,203,823	16,455,887	....

The much higher cost of the timbering required for the anthracite mines is due to several causes. In the first place, many of the anthracite workings lie at great depths, and some of the larger properties have many miles of gangways which have to be carefully maintained. They are below water level, and, as a result of the combined action of air and mine water, the timbers decay rapidly. Some of the beds are of enormous thickness, and require vast quantities of timber in the construction of ''square sets'' to support the roof and preserve the workings in overlying coal. Moreover, since the hills in the immediate vicinity of the anthracite mines have been largely denuded of timber suitable for mine supports, operators are obliged to obtain their supplies from considerable distances. The majority of the bituminous coal mines, on the other hand (particularly in the Eastern States), lie at comparatively moderate depths and above water level. The methods of mining frequently permit the withdrawal of the timber used for support in the ''rooms;'' the roof is allowed to fall in and the timber is used over a number of times. When ''longwall'' methods are employed timber is used only for the support of the gangways, and in some cases, where the roof is firm and the coal strong, may be entirely dispensed with.

BITUMINOUS COAL MINES.

Table 52 gives the kind and quantity of round and sawed timber used in 2,940 bituminous coal mines. In 907 bituminous mines no timber was used. The totals are 91,309,700 cubic feet of round timber and 140,790,000 board feet of sawed timber. By far the larger part of the timber consisted of hardwoods, among which oak predominated. Next to oak in importance are pine and hemlock, followed by fir, and chestnut and several other hardwoods in smaller quantities.

TABLE 52.—*Kind and quantity of timber used in 2,940 bituminous coal mines in 1905.*

Kind.	Round timber.	Sawed timber.	Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*		*Cubic feet.*	*Board feet.*
Oak	22,592,500	55,082,000	Elm	117,200	801,000
Pine	4,374,200	10,101,000	Hickory	93,800	....
Hemlock	2,267,900	5,599,000	Poplar	....	475,000
Fir	1,919,100	6,074,000	Mixed hardwoods	45,464,400	36,183,000
Chestnut	1,107,900	760,000	Mixed softwoods	1,205,000	422,000
Beech	383,200	1,475,000	Not specified	11,390,300	19,228,000
Aspen	137,300	....			
Maple	133,200	4,342,000	Total	91,309,700	140,790,000
Spruce	123,700	248,000			

In Table 53 are given the quantity and cost of the timber used in bituminous coal mines, by States. Pennsylvania, with 524 mines, used 37,826,000 cubic feet of round timber and 55,716,000 board feet of sawed timber, costing altogether $2,290,053. The average cost of the round timber was 3.5 cents per cubic foot and that of the sawed timber $17.39 per thousand board feet. In Illinois 400 mines used 10,342,300 cubic feet of round timber, costing 6 cents per cubic foot, and 7,025,000 board feet of sawed timber, costing $22.04 per thousand board feet, the total cost being $778,186. The 325 mines in West Virginia used 6,716,000 cubic feet of round timber and 19,645,000 board feet of sawed timber. The total cost was $561,061; that of the round timber being 4.6 cents per cubic foot, and that of the sawed timber $12.76 per thousand board feet. Next in order of total outlay for timber come Ohio, with $471,730; Iowa, with $232,148; Indiana, with $220,209, and Alabama with $216,221. None of the other States used over $200,000 worth of timber.

Table 53.—*Quantity and cost of timber used in bituminous coal mines in 1905, by States.*

State.	Number of mines.	Round timber.		Sawed timber.		Total cost.
		Cubic feet.	Cost per cubic foot.	Board feet.	Cost per M board feet.	
Alabama	82	4,538,500	$0.038	4,372,000	$10.44	$216,221
Arkansas	34	876,200	.040	1,091,000	15.08	51,352
Colorado	69	1,315,500	.116	457,000	33.76	168,580
Illinois	400	10,342,300	.060	7,025,000	22.04	778,186
Indiana	162	3,126,400	.033	7,079,000	16.43	220,209
Indian Territory	38	1,765,400	.035	1,686,000	15.29	87,842
Iowa	161	2,306,000	.073	2,438,000	26.43	232,148
Kansas	89	922,800	.077	1,880,000	18.16	104,890
Kentucky	170	2,006,200	.041	5,332,000	12.03	106,610
Maryland	28	2,633,300	.057	2,555,000	15.42	188,471
Michigan	20	1,187,900	.051	938,000	18.11	77,664
Missouri	143	2,155,600	.040	1,185,000	18.04	107,817
Montana	26	617,600	.086	511,000	21.76	64,015
New Mexico	18	460,000	.105	1,023,000	12.18	60,745
North Dakota	37	119,600	.108	102,000	20.54	15,032
Ohio	399	4,427,700	.056	14,781,000	15.08	471,730
Pennsylvania	524	37,826,000	.035	55,716,000	17.39	2,290,053
Tennessee	88	2,405,900	.028	3,104,000	12.10	105,746
Texas	18	343,700	.042	1,304,000	16.68	36,355
Utah	13	338,100	.070	174,000	12.51	25,799
Virginia	30	894,900	.050	1,707,000	13.08	66,869
Washington	32	1,345,500	.050	5,649,000	5.58	98,747
West Virginia	325	6,715,000	.046	19,645,000	12.76	561,061
Wyoming	16	1,376,500	.104	444,000	16.93	151,138
All others (Georgia, Oregon, California, Idaho)	17	1,262,000	....	652,000	....	42,651
Total	2,940	91,309,700	....	140,790,000	....	6,379,931

Timber is seen to be more expensive in Colorado than in any other State. The average cost of the round timber in that State was 11.6 cents per cubic foot and that of the sawed timber $33.76 per thousand board feet. The large amount of mining has made a heavy demand for timber, and, although most of the round timber is obtained locally, much of the sawed timber must be shipped in from considerable distances at high freight rates. Round timber in Wyoming and New Mexico cost 10.4 and 10.5 cents per cubic foot, respectively, or nearly as much as in Colorado; but the fact that sawed timber was obtained locally kept its price down to $16.93 per thousand in Wyoming and $12.18 in New Mexico. The lowest average price reported for round timber was 2.8 cents per cubic foot in Tennessee, and for sawed timber $5.58 per thousand in Washington. It must be borne in mind, however, that in many cases the timber used was cut from land belonging to the mine operators, and the cost includes only cutting and hauling.

In the Appalachian region the bituminous coal beds lie above water level, while in the interior region, covering Indiana, Illinois, Iowa, Missouri, Arkansas, Kansas, and Indian Territory, the beds are generally below water level, and relatively more timber is required to offset decay.

ANTHRACITE COAL MINES.

In Table 54 is given the kind and quantity of timber reported by 216 anthracite mines. The total comprises 43,676,000 cubic feet of round timber and 101,210,000 board feet of sawed timber. Of the species used for round timber, yellow pine ranks first, with 8,348,000 cubic feet; of the sawed timber, hemlock furnishes 53,040,000 board feet, or over one-half of the total quantity. Oak ranks next, with 5,192,200 feet of round timber and 2,380,000 feet of sawed timber. A large amount of oak is also undoubtedly included under the item "Mixed hardwoods." Much of the pine is shipped in from the South, but most of the other timber used is cut in Pennsylvania.

TABLE 54.—*Kind and quantity of timber used in 216 anthracite coal mines in 1905.*

Kind.	Round timber.	Sawed timber.	Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*		*Cubic feet.*	*Board feet.*
Pine	8,348,800	12,054,000	Maple	2,200	1,449,000
Oak	5,192,200	2,380,000	Mixed hardwoods	8,533,000	23,847,000
Hemlock	985,000	53,040,000	Mixed softwoods	398,900	1,144,000
Chestnut	370,800	....	Not specified	19,609,400	6,974,000
Beech	139,700	22,000			
Spruce	96,000	300,000	Total	43,676,000	101,210,000

Table 55 gives the cost of the timber used in 216 anthracite mines of Pennsylvania, to which State the production of anthracite coal is confined. The average cost of the round timber was 6.6 cents per cubic foot and that of the sawed timber $15.17 per thousand board feet; the total cost was $4,433,125. Comparing these figures with those for bituminous mines in Pennsylvania, in Table 53, it will be seen that, though the values of the sawed timber are not far apart in the two cases, the cost of the round timber per cubic foot is nearly twice as great for the anthracite mines as for the bituminous. This is because most of the round timber for the bituminous coal mines is cut locally, whereas much of that for the anthracite mines consists of loblolly pine in large sizes which is shipped in at considerable expense.

TABLE 55.—*Quantity and cost of timber used in anthracite coal mines of Pennsylvania in 1905.*

No. of mines, 216..	Round timber.. 43,676,000 cubic feet, @ 6.6 cents per cu. ft.	Total cost..	$4,433,125
	Sawed timber.. 101,210,000 board feet, @ $15.17 per M bd. ft.		

The 216 mines from which reports were received produced approximately 83 per cent of the total amount of anthracite coal mined in 1905. Assuming that the other mines used timber in the same proportions as those which reported—a fair assumption because of the uniform conditions throughout the anthracite region—it may safely be said that the total amount of timber used in all anthracite mines comprises not less than 52,620,000 cubic feet of round timber and nearly 121,620,000 board feet of sawed timber, costing over $5,340,000. As the total tonnage of anthracite mined in 1905 was 69,339,152 long tons, the cost of timber was 7.7 cents per long ton of coal mined.

MINES FOR PRECIOUS METALS.

The kind and quantity of timber used in 1,718 mines for precious metals is given in Table 56. In 6,981 mines no timber was used. The total amount of round timber was 15,282,500 cubic feet and of sawed timber 164,956,000 board feet. Since these mines are located entirely in the Rocky Mountain and Pacific coast regions, where the native timber consists largely of softwoods, very little hardwood is used in them, and most of this is probably aspen, although the reports were not specific on this point. Pine ranks first, with 4,851,500 cubic feet of round timber and 67,343,000 board feet of sawed timber, followed by fir, with 2,436,400 cubic feet of round and 72,441,000 board feet of sawed timber. Spruce comes third, with 829,600 cubic feet of round and 4,642,000 board feet of sawed timber. The "mixed softwoods," which consisted principally of pine, fir, and spruce, show 6,471,500 cubic feet of round and 19,624,000 board feet of sawed timber.

TABLE 56.—*Kind and quantity of timber used in 1,718 precious-metal mines in 1905.*

Kind.	Round timber.	Sawed timber.	Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*		*Cubic feet.*	*Board feet.*
Pine	4,851,500	67,343,000	Mixed hardwoods	28,900	....
Fir	2,436,400	72,441,000	Not specified	664,600	906,000
Spruce	829,600	4,642,000			
Mixed softwoods	6,471,500	19,624,000	Total	15,282,500	164,956,000

In Table 57 is given the quantity and cost of timber used in the precious-metal mines. Montana comes first, with 127 mines, which required 3,390,800 cubic feet of round and 62,341,000 board feet of sawed timber, representing a total cost of $1,265,838 and an average cost of 9.4 cents per cubic foot for round timber and $15.20 per thousand for sawed timber. Next in order comes Arizona, in which 139 mines used 1,045,500 cubic feet of round and 40,498,000 board feet of sawed timber, with a total cost of $1,034,614. In Arizona the average cost of round timber was 10.2 cents per cubic foot and of sawed timber $22.91 per thousand board feet. Then, in order of total cost of timber used, come California, with 289 mines and a cost of $499,329 for timber; Colorado, with 399 mines and a cost of $462,893; Utah, with 118 mines and $455,599; Idaho, with 157 mines and $357,475, and Nevada, where 133 mines used timber costing $144,519. A relatively small amount of timber was used in mines for precious metals in other States.

TABLE 57.—*Quantity and cost of timber used in precious-metal mines in 1905, by States.*

State.	Number of mines.	Round timber.		Sawed timber.		Total cost.
		Cubic feet.	Cost per cubic foot.	Board feet.	Cost per M board feet.	
Arizona	139	1,045,500	$0.102	40,498,000	$22.91	$1,034,614
California	289	3,947,400	.076	10,847,000	18.41	499,329
Colorado	399	2,666,300	.087	11,966,000	19.23	462,839
Idaho	157	2,083,500	.103	9,876,000	14.41	357,475
Montana	127	3,390,800	.094	62,341,000	15.20	1,265,838
Nevada	133	81,700	.040	3,603,000	31.10	144,519
New Mexico	59	274,800	.042	762,000	19.07	26,152
Oregon	114	427,000	.061	2,569,000	13.04	59,556
South Dakota	69	486,800	.080	2,020,000	18.31	75,883
Utah	118	730,900	.069	19,150,000	21.17	455,599
Washington	50	61,400	.072	1,133,000	9.95	15,727
Wyoming	64	86,400	.053	191,000	18.69	8,159
Total	1,718	152,825,000	....	164,956,000	....	4,405,690

The highest average cost reported for round timber was 10.3 cents per cubic foot in Idaho and 10.2 cents in Arizona. The highest average cost for sawed timber was $31.10 per thousand in Nevada, which also reports the lowest cost for round timber—4 cents per cubic foot. The explanation of this apparent anomaly is that the small amount of round timber used is chiefly cut at little cost in the vicinity of the mines, while almost all of the sawed timber is shipped in at high freight rates.

IRON MINES.

In Table 58 are given the kind and quantity of timber used in 146 iron mines, 422 mines reporting that no timber was used. This consisted of 13,484,000 cubic feet of round and 13,929,000 board feet of sawed timber. Pine ranks first, with 1,177,500 cubic feet of round and 5,209,000 board feet of sawed timber, followed by hemlock, with 901,400 and 1,783,000 for round and sawed, respectively. Oak comes third, with 117,700 cubic feet of round and 280,000 board feet of sawed timber. Small amounts of spruce, fir, and maple were reported. The figures under the items of "Mixed" and "Not specified" are so large for the iron mines that the amounts for the species given are not at all accurate. Were accurate figures available the figures for pine, hemlock, and oak would be largely increased.

TABLE 58.—*Kind and quantity of timber used in 146 iron mines in 1905.*

Kind.	Round timber.	Sawed timber.	Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*		*Cubic feet.*	*Board feet.*
Pine	1,177,500	5,209,000	Mixed hardwoods	651,700	187.000
Hemlock	901,400	1,783,000	Mixed softwoods	1,324,800	890,000
Oak	117,700	280,000	Not specified	9,261,600	5,131,000
Spruce	49,300	11,000			
Fir	....	256,000	Total	13,484,000	13,929,000
Maple	....	182,000			

Table 59 gives the quantity and cost of timber used in iron mines. In Michigan 40 mines took 11,414,700 cubic feet of round timber and 10,549,000 board feet of sawed timber, having a total cost of $669,323. The average cost of the round timber was 4.7 cents per cubic foot and of the sawed timber $12.24 per thousand. The preeminence of Michigan in the production of iron ore is strikingly shown by these figures, as this State used 85 per cent of the round timber and 76 per cent of the sawed timber required by all the iron mines from which reports were received. The relative order in which the other States used timber for iron mines is: Minnesota, Colorado, New Jersey, Alabama, Pennsylvania, and Virginia.

TABLE 59.—*Quantity and cost of timber usea in iron mines, by States, in 1905.*

State.	Number of mines.	Round timber.		Sawed timber.		Total cost.
		Cubic feet.	Cost per cubic foot.	Board feet.	Cost per M board feet.	
Alabama	18	183,700	$0.078	314,000	$15.05	$19,111
Colorado	19	359,100	.145	1,095,000	19.81	73,820
Michigan	40	11,414,700	.047	10,549,000	12.24	669,323
Minnesota	25	756,000	.097	1,222,000	12.56	88,450
New Jersey	11	462,400	.073	258,000	21.33	39,365
Pennsylvania	14	147,900	.055	398,000	21.37	16,577
Virginia	16	160,200	.041	93,000	13.48	7,803
Total	143	13,484,000	....	13,929,000	....	914,449

STATES IN WHICH THE COST OF MINE TIMBER EXCEEDED $500,000 IN 1905.

In eight States the cost of timber used in mines in 1905 exceeded half a million dollars each. These States are given in order of relative importance in Table 60. Pennsylvania is unique in possessing all the anthracite mines, and, in addition, the most and the largest bituminous coal mines, as well as a number of iron mines. The timber used by 754 mines in this State amounted to 47,606,500 cubic feet of round and 157,324,000 board feet of sawed timber, having a total cost of $6,739,755, or five times the cost of the timber used in the mines of any other State. In Montana 153 mines for precious metals and bituminous coal used 4,008,400 cubic feet of round timber and 62,852,000 board feet of sawed timber, costing altogether $1,329,853. In Arizona 139 precious-metal mines required 1,045,500 cubic feet of round timber and 40,498,000 board feet of sawed timber, having a total cost of $1,034,614. It is the high cost of timber rather than the large amount that gives Arizona such a prominent place, for the quantity used was actually less than that given for any other State in Table 60. In Illinois 400 soft coal mines required 10,342,300 cubic feet of round and 7,025,000 board feet of sawed timber, costing $778,186. Then follows Michigan with a total cost for timber of $746,987, West Virginia with $561,061, Colorado with $605,239, and California with $503,124.

TABLE 60.—*States in which the cost of mine timber exceeded $500,000 in 1905.*

State.	Number of mines.	Round timber.	Sawed timber.	Total cost.
		Cubic feet.	*Board feet.*	
Pennsylvania	754	47,606,500	157,324,000	$6,739,755
Montana	153	4,008,400	62,852,000	1,329,853
Arizona	139	1,045,500	40,498,000	1,034,614
Illinois	400	10,342,300	7,025,000	778,186
Michigan	60	12,602,600	11,487,000	746,987
West Virginia	325	6,716,000	19,645,000	561,061
Colorado	487	4,340,900	13,518,000	605,239
California	291	3,971,200	10,942,000	503,124

CONSUMPTION OF TANBARK IN 1905.

By H. M. HALE, *Forest Assistant.*

The statement of the consumption of tanbark in 1905 here given is based upon the reports of 222 firms operating 477 tanneries. The total amount of bark reported is 1,104,045 cords, of which hemlock constitutes 799,755 cords, or 73 per cent, and oak 304,290 cords, or 27 per cent. The average price per cord reported for hemlock bark is $6.32 and for the oak bark $10.44, making a total value of $8,232,457.

In presenting these statistics the Forest Service desires to acknowledge the efficient cooperation of the tanners throughout the United States in furnishing the desired information.

QUANTITY AND VALUE.

Table 61 shows, by States, the number of tanneries reporting, and the quantity, per cent, and value of the hemlock and oak bark purchased in 1905.

It will be seen that the tanneries of Pennsylvania lead in the quantity of bark purchased, the total being 428,709 cords, of which 379,806 cords were hemlock and 48,903 cords oak. This is nearly double the quantity of bark purchased in Michigan, the State which ranks next in importance. Pennsylvania and Michigan are by far the largest users of bark, particularly hemlock, and together these two States purchased over 60 per cent of the total quantity reported. In the purchase of oak bark Virginia holds first place with 73,871 cords.

Since tanneries are usually located in or near the regions from which they draw their supply of bark, the assumption may fairly be made that, on the whole, the figures for purchases also represent approximately the production in the States mentioned. On this assumption, the leading States in the production of hemlock bark are Pennsylvania, Michigan, Wisconsin, West Virginia, Maine, and New York in the order named, aggregating 97 per cent of the total production. Similarly, over 90 per cent of the oak bark is produced by the following States: Virginia, California, Pennsylvania, West Virginia, Tennessee, North Carolina, and Kentucky.

In addition to bark and chemicals, the tanneries use large quantities of extracts made from hemlock and oak bark and chestnut wood, together with a considerable amount of imported quebracho and gambier. Sumac leaves and palmetto extracts are also used to some extent.

TABLE 61.—*Tanbark purchased by tanneries in 1905.*

QUANTITY.

State.	Number of tanneries.	Hemlock.		Oak.		Total cords.	Per cent of purchases in State to that of total in United States.
		Cords.	Per cent.	Cords.	Per cent.		
Pennsylvania	52	379,806	88.5	48,903	11.5	428,709	38.9
Michigan	60	240,652	100.0	....	....	240,653	21.8
West Virginia	33	37,845	49.9	37,985	50.1	75,830	6.8
Virginia	55	1,238	2.0	73,871	98.0	75,109	6.8
Wisconsin	18	68,247	100.0	....	....	68,247	6.2
California	36	....	....	50,007	100.0	50,007	4.5
Tennessee	28	3,651	11.0	28,683	89.0	32,334	2.9
Maine	23	29,750	100.0	....	....	29,750	2.7
North Carolina	17	1,215	4.0	27,866	96.0	29,081	2.6
New York	51	19,916	99.4	137	.6	20,053	1.8
Kentucky	28	57	.4	17,681	99.6	17,738	1.6
Vermont	12	7,497	100.0	....	....	7,497	.7
Maryland	6	60	.8	7,423	99.2	7,483	.7
New Hampshire	11	5,032	100.0	....	....	5,032	.5
Ohio	11	341	7.7	4,123	92.3	4,464	.4
Massachusetts	4	2,339	100.0	....	....	2,339	.2
Georgia	13	....	....	4,457	100.0	4,457	.4
Alabama	3	....	....	1,500	100.0	1,500	.1
New Jersey	5	459	32.5	957	67.5	1,416	.1
Oregon	3	975	100.0	....	....	975	.1
Indiana	3	....	....	485	100.0	485	.1
All others	5	675	....	212	....	887	.1
Total	477	799,755	....	304,290	....	1,104,045	100.0

VALUE.

State.	Hemlock.		Oak.		Total.
	Average price per cord.	Amount.	Average price per cord.	Amount.	
Pennsylvania	$7.54	$3,863,737	$8.40	$410,785	$3,274,522
Michigan	7.02	1,689,377	....	....	1,689,377
West Virginia	....	....	7.75	294,384	294,384
Virginia	....	....	7.87	581,365	581,365
Wisconsin	....	....	7.07	482,506	482,506
California	....	....	19.04	952,133	952,133
Tennessee	6.30	23,001	....	....	23,001
Maine	6.80	202,300	....	....	202,300
North Carolina	....	....	6.17	171,933	171,933
New York	7.07	140,806	11.00	1,507	142,313
Kentucky	11.25	641	8.86	156,654	157,295
Vermont	6.87	51,504	....	....	51,504
Maryland	5.00	300	6.00	44,838	45,138
New Hampshire	7.75	38,998	....	....	38,998
Ohio	9.74	3,321	9.55	39,375	42,696
Massachusetts	9.75	23,005	....	....	23,005
Georgia	....	....	5.64	15,137	15,137
Alabama	....	....	5.64	8,460	8,460
New Jersey	12.68	5,820	11.75	11,245	17,065
Oregon	8.00	7,800	....	....	7,800
Indiana	....	....	9.24	4,161	4,161
All others	8.13	5,488	8.85	1,876	7,364
Total	....	5,056,098	....	3,176,359	8,232,457

CONSUMPTION OF BARK AND EXTRACTS.

Table 62 gives the amount of domestic bark and extracts used by the tanneries in 1900, as reported by the Twelfth Census, compared with the figures gathered by the Forest Service for 1905.

TABLE 62.—*Consumption of domestic bark and extracts in 1900 and 1905.*

Kind.	Bark.		Extract.	
	Census, 1900.	Forest Service, 1905.	Census, 1900.	Forest Service, 1905.
	Cords.	*Cords.*	*Barrels.*[a]	*Barrels.*[a]
Hemlock	1,170,131	799,755	12,812	52,430
Oak	445,934	304,290	54,231	187,635
Chestnut				51,224
Palmetto				1,110
Total	1,616,065	1,104,045	67,043	292,399

[a] Barrel equivalent to 500 pounds.

While the Census figures upon bark for 1900 are 512,020 cords greater than those of the Forest Service for 1905, the amount of extract reported to the Forest Service is 225,356 barrels in excess of the amount shown by the Census. This indicates that while the figures of the Forest Service are incomplete, owing to the failure of some firms to report, there is undoubtedly a rapidly growing tendency on the part of the tanners to partially replace bark with extracts.

During the period which has elapsed since the Twelfth Census was taken, the use of the extract of quebracho, a South American tree, has largely increased. Quebracho contains a very high percentage of tannin and gives excellent results when mixed with various quantities of domestic barks or extracts. This extract can be imported at a price which compares very favorably with the present price of domestic barks, and the drain on the supply of tanbark in the United States is thus considerably relieved. Unfortunately, statistics showing the importation of quebracho for the calendar year of 1905 are not available because the figures for this extract have not until recently been kept separate from those for other extracts. An indication of the extent to which it is imported, however, can be gained from the statistics for the month of July, 1906, which give 7,244,205 pounds, or 14,480 barrels, with a value of $207,095. Estimating on this basis for twelve months gives an importation of approximately 87,000,000 pounds, with a value of $2,480,000. A comparison of these figures with those of the Twelfth Census for the amount of quebracho used in the manufacture of leather in 1900, which was only 20,360 barrels or bales, with a value of $292,133, gives some idea of the great increase in the use of this extract. Other tropical products are also receiving considerable attention by progressive tanners with a view of supplementing our native supply to a still greater extent.

IMPORTS OF HEMLOCK BARK.

The imports of hemlock bark from Canada show a marked decrease, as will be seen by the following statement for the last three fiscal years taken from the report of the Bureau of Statistics of the Department of Commerce and Labor for June, 1906:

TABLE 63.—*Imports of hemlock bark, by fiscal years.*

Year.	Cords.	Value.
1904	14,111	$63,460
1905	13,511	64,181
1906	7,467	35,860

Not only have substitutes for bark been found, but the processes in use have been greatly improved, so that in the best equipped tanneries at the present time from 20 to 30 per cent more leather can be tanned with the same amount of bark than was possible a few years ago.

Since the statistics of the Twelfth Census on the materials used by the manufacturers of leather do not indicate the number of establishments using bark or wood extracts, it is impossible to determine whether the number of establishments has increased or decreased during the period from 1900 to 1905. The total number of establishments, according to the census, engaged in the manufacture of leather in 1900 was 1,306, but this includes the manufacturers of both sole and upper leather. Little bark or wood extract is used in tanning uppers, and so no reports from such tanners were requested by the Forest Service.

WOOD USED FOR VENEER IN 1905.

By H. M. Hale, *Forest Assistant.*

The figures given in this circular were compiled from statements of 128 manufacturers of veneer throughout the country. As was to be expected in a new statistical investigation, returns were not entirely complete, though they clearly indicate the relative importance of the various woods used.

The absence of figures in the census reports shows that, down to 1900, veneering had not assumed the importance of an industry worthy of special attention. At the present time, however, there are in the United States over 128 establishments which cut veneer, using annually more than 189,000,000 feet log measure, the equivalent of approximately 217,000,000 board feet, which yields 1,108,000,000 square feet of veneer. It is evident that the growth of the veneer industry has been strikingly rapid.

Veneers are of three general classes—sawed, sliced, and rotary cut. Sawed veneers, which have been longest used, are of highest grade. Sliced veneers rank next in order of quality. Although the returns from the manufacturers do not indicate the exact process, there is little doubt that 75 per cent of the oak veneers are either sawed or sliced. The rotary process is very extensively employed for all woods except oak.

PRODUCTION BY SPECIES.

Table 64 shows the quantity and percentage of each kind of timber used and the number of square feet of veneer manufactured in 1905. The returns from the manufacturers gave the quantity of wood used in log scale; these figures are tabulated under the caption of "log scale." Since the mill scale will, on an average, overrun the log scale about 20 per cent, in computing the average number of square feet of veneer produced per foot board measure the log scale was converted into mill scale by increasing each item 20 per cent in the belief that results so obtained would be more accurate than those based on log scale.

TABLE 64.—*Wood used and veneer stock produced in 1905.*

Kind.	Per cent.	Log scale (1,000 feet).	Veneer (1,000 square feet).	Average number square feet veneer per foot B. M.
Red gum	21.8	39,573	187,940	3.9
Maple	14.5	26,246	179,809	5.7
Yellow poplar	14.4	26,164	151,566	4.8
Cottonwood	9.0	16,357	45,223	2.3
White oak	8.9	16,129	115,265	6.0
Yellow pine	7.0	12,688	41,069	2.7
Birch	7.0	12,643	128,521	8.5
Basswood	6.3	11,376	82,925	6.0
Elm	3.1	5,544	60,708	9.0
Red oak	2.7	4,955	31,054	5.2
Ash	1.3	2,461	21,648	7.3
Walnut	1.0	1,725	21,181	10.2
Beech	.8	1,400	18,765	11.1
Sycamore	.3	576	1,435	2.1
Tupelo	.2	314	1,806	4.8
Miscellaneous	1.7	2,995	19,603	5.5
Total	100.0	181,146	1,108,518	5.1

It should be noted that the results do not represent the average thickness of the veneers, as might at first be supposed, because the item of board feet carries the gross amount of wood in the log, while the item of square feet of veneer includes the finished, salable product only, no account being taken of the waste from reducing the log to a true cylinder or from saw kerf, slabs, or defective parts of logs and cores. For example, when veneers are sawed one-twentieth of an inch thick, another one-twentieth of an inch is lost in saw kerf, so that, even provided all the other forms of waste are saved, not more than ten thicknesses can be obtained from a board an inch thick.

The importance of red gum, which furnishes in this industry 21.8 per cent of the raw material and nearly 17 per cent of the veneer, is clearly indicated. This is the more striking when it is remembered that this species has been utilized only a few years.

Maple ranks second in quantity of raw material, and furnishes 14.5 per cent. Yellow poplar is the only other kind of timber furnishing more than 10 per cent of the raw material. It ranks third both in quantity of wood and square feet of veneer. These three species, red gum, maple, and yellow poplar, furnish more than one-half of the total quantity of wood used.

White oak, although ranking fifth in the scale of quantity, holds a high place among the veneer woods. Probably no other veneer is so much in demand as this, and if data were available to show its exact value the result would be a revelation to those not thoroughly familiar with the situation.

The results show that for all species the average number of veneers produced per foot board measure is 5.1. Of the individual species, beech is cut the thinnest, the average being 11.1 square feet per board foot. This is doubtless due in part to the fact that this is a favorite wood for the manufacture of wooden plates, and such stock is cut about 30 to the inch. Walnut ranks next, with 10.2 to the inch. The fact that it is a scarce and valuable wood readily accounts for this. Sycamore, cottonwood, and pine are cut thickest.

The use of a large number of species for veneering is shown by the reports. While the fifteen kinds tabulated constitute by far the greater part of the wood used, there are nearly as many more used in small quantities, among which are cherry, chestnut, butternut, hickory, cucumber, and holly. It will be noted that in Wisconsin the leading wood is basswood; in Tennessee, red gum; in Indiana, white oak; in New York, maple, and in Missouri, cottonwood.

Not all of the wood classed as veneer is actually used for veneering in the true sense, for with the development of veneering machinery a number of new uses have been found for wood in the form of veneer. Such of the softer woods as gum, cottonwood, and poplar are largely veneered for boxes, baskets, egg crates, and similar products. Such woods do not yield high grade veneers, but are used extensively for building up panels to be finished with a choice wood.

Woods which take a good finish and possess a pleasing grain or color, such as oak, maple, birch, or walnut, furnish the bulk of the true veneers; in fact it may safely be assumed that practically all of the walnut and oak and a large percentage of the maple shown in this report are used in this way. Furniture and, to a limited extent, interior finishing, consume the most of these species.

One of the most difficult problems to solve in the handling of veneer stock is the drying. A query in regard to drying methods was sent to manufacturers, but the replies failed to indicate a marked preference for any one method. One-third of the establishments use no artificial process. It does not follow, however, that as much as one-third of the veneer is dried in the open air. On the contrary, probably much less than one-third is so dried.

The economical use of the cores which remain after a log is cut by the rotary process is a problem of such general interest that inquiry was made on the schedules as to the present practice. The results show that 39 establishments use all cores for fuel; 50 use all or part of them for fuel; 33 convert them into excelsior. One reports use for pulp; another their use for porch posts. The remainder report various uses, chiefly, however, combinations of lumber, excelsior, crates, boxes, and baskets.

PRODUCTION BY STATES.

TABLE 65.—*Wood used for veneer stock, by States.*

State.	Firms reporting.	Aggregate log scale.	Per cent.	Red gum.	Maple.	Yellow poplar.	Cottonwood.	White oak.	Yellow pine.
		1,000 board feet.		*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*
Alabama	4	3,711	2.1	2,300	....	1,061	....	....	250
Florida	3	5,598	3.1	....	....	....	....	....	5,598
Georgia	3	1,419	.8	6	....	205	....	....	1,208
Illinois	5	12,838	6.9	9,598	170	509	415	....	....
Indiana	10	17,556	9.7	1,500	1,500	1,327	....	8,050	....
Kentucky	3	4,673	2.6	850	50	2,612	....	875	....
Louisiana	3	2,960	1.6	300	....	160	2,000	....	250
Maine	3	2,570	1.4	....	....	20	....	....	....
Maryland	3	2,630	1.5	330	100	880	....	900	....
Michigan	13	11,732	6.5	....	6,499	100	....	695	....
Missouri	5	13,119	7.3	5,628	613	4	3,292	856	....
New York	12	17,479	9.7	....	14,438	....	....	535	....
North Carolina	12	7,521	4.2	3,022	....	4,069	....	180	230
Ohio	5	5,093	2.8	....	100	2,000	....	2,588	....
Pennsylvania	3	1,550	.9	....	400	250	....	....	....
South Carolina	4	12,016	6.7	2,613	....	4,328	....	....	5,052
Tennessee	3	19,700	10.9	9,000	....	3,000	7,500	150	....
Virginia	6	5,010	2.8	3,500	1	969	....	401	100
West Virginia	3	3,475	1.9	....	2	3,361	....	114	....
Wisconsin	16	22,785	12.6	....	1,475	100	....	774	....
All others [a]	9	7,531	4.2	926	900	1,109	3,150	11	....
Total	128	181,146	100.0	39,573	26,246	26,164	16,357	16,129	12,688

State.	Birch.	Basswood.	Elm.	Red oak.	Ash.	Beech.	Sycamore.	Tupelo.	Miscellaneous hardwoods.
	1,000 board feet.	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*	*1,000 board feet.*
Alabama	....	....	....	....	....	....	....	....	100
Florida	....	....	....	....	....	....	....	....	....
Georgia	....	....	....	....	....	....	....	....	....
Illinois	170	....	262	....	4	....	5	....	1,705
Indiana	1,220	367	366	1,056	200	....	....	....	1,970
Kentucky	....	....	....	225	61	....	....	....	....
Louisiana	....	....	....	....	....	....	....	....	250
Maine	800	1,750	....	....	....	....	....	....	....
Maryland	30	....	....	300	10	....	80	....	....
Michigan	728	1,612	1,067	110	518	400	....	....	3
Missouri	22	....	1,148	269	90	....	491	274	432
New York	631	543	489	311	332	200	....	....	....
North Carolina	....	....	....	20	....	....	....	....	....
Ohio	....	150	125	5	....	100	....	....	25
Pennsylvania	....	....	400	....	....	500	....	....	....
South Carolina	....	....	....	....	3	....	....	20	....
Tennessee	....	....	....	50	....	....	....	....	....
Virginia	....	10	....	20	9	....	....	....	....
West Virginia	....	....	....	....	....	....	....	....	....
Wisconsin	8,240	6,914	1,487	2,589	971	....	....	....	235
All others [a]	802	30	200	....	263	200	....	20	....
Total	12,643	11,376	5,544	4,955	2,461	1,400	576	314	4,720

[a] Delaware, Mississippi, New Jersey Vermont, Washington.

WOOD USED FOR DISTILLATION IN 1905.

By H. M. Hale, *Forest Assistant.*

The following statistics of the wood used for and the products of distillation in 1905 have been compiled from reports made by the operators of 82 distillation plants throughout the United States. The returns give the amounts of softwoods and hardwoods, but not the separate amounts of each kind in each class. Of the hardwoods, it is safe to say that beech, birch, and maple furnished over 80 per cent of the amount, while oak and other kinds of timber furnished the remainder. Of the softwoods, all of which are native to the South, longleaf pine probably furnished by far the greatest amount.

The tables show that the total consumption of the 82 plants was 676,739 cords, valued at $2,010,611; and that the products comprise 26,670,139 bushels of charcoal, 5,062,076 gallons of alcohol, 86,685,129 pounds of acetate of lime, 238,180 gallons of turpentine, and 1,039,980 gallons of tar and oil, besides 434,780 gallons of oil from pine distillation. The total for tar distillation from hardwoods is very small. As a matter of fact, the figures do not even approximate the actual amount, but, instead, represent only the amount saved and refined. Owing to certain characteristics of the tar obtained from hardwoods, which make it of low commercial value, most of it is used for fuel, either in carbonizing the wood or in refining the liquor, and when so used no record is kept of the quantity produced.

HARDWOOD DISTILLATION.

Tables 66 and 67 give the quantity of hardwood distilled and of the products. It will be seen that three States—Michigan, Pennsylvania, and New York—are in the lead. Of the States included under the heading "All others," Missouri ranks first. It may therefore be asserted that the hardwood distillation industry is practically confined to these four States. The 67 plants reported from these States 659,770 cords of hardwood, with a total value of $1,967,806. The products were 26,370,033 bushels of charcoal, 5,062,076 gallons of alcohol, and 86,685,129 pounds of acetate. For the reason already given the amount of tar, oil, etc., is not correctly represented by the figures given.

TABLE 66.—*Hardwood distillation.*

State.	Number of establishments.	Wood used.		
		Cords.	Average value per cord.	Total value of raw material.
Michigan	6	239,992	$2.61	$627,521
New York	22	119,937	3.20	383,691
Pennsylvania	35	242,519	3.51	851,579
All others [a]	4	57,322	1.84	105,015
Total	67	659,770	....	1,967,806

[a] Kentucky, Maine, and Minnesota.

TABLE 67.—*Hardwood distillation.*

State.	Products.			
	Charcoal.	Crude alcohol.	Acetate.	Tar and oil
	Bushels.[a]	*Gallons.*	*Pounds.*	*Gallons.*
Michigan	8,143,387	1,246,121	14,778,695	549,730
New York	4,986,865	1,392,995	25,392,564	20,000
Pennsylvania	10,478,794	2,324,329	45,778,093	80,750
All others [b]	2,760,987	98,631	735,777	27,000
Total	26,370,033	5,062,076	86,685,129	677,480

[a] Bushel equivalent to 20 pounds.

[b] Kentucky, Maine, and Minnesota.

Pennsylvania leads in the amount of charcoal per cord, the results showing an average of 860 pounds, or 43 bushels. New York ranks second, with 840 pounds, or 42 bushels. Michigan, with but 680 pounds, or 34 bushels, is in striking contrast to the average production. In number of gallons of alcohol produced per cord, New York leads both Pennsylvania and Michigan, with an average of 11.6 gallons, followed closely by Pennsylvania, with an average of 9.6 gallons. The average for Michigan is but little more than half of either of these States, namely, 4.8 gallons. This may be due to the fact that in New York and Pennsylvania the wood is carbonized almost entirely in retorts, while in Michigan the brick-kiln with direct fire is generally employed.

PINE DISTILLATION.

Tables 68 and 69 show the quantity of pine distilled and the products. Compared with the figures for hardwood, the quantity is insignificant; the total amount used by the 15 operators reporting was but 16,969 cords, with a value of $42,805. The products differed, of course, from those of hardwood distillation, in containing a large amount of tar and turpentine, but no alcohol. Much less charcoal is obtained from pine than from hardwood, the average relative proportions being approximately 350 pounds per cord, as against approximately 700 pounds per cord. Tar, a by-product in hardwood distillation, is one of the major products of pine distillation. The average price of pine wood per cord also is lower.

TABLE 68.—*Pine distillation.*

State.	Number of establishments.	Wood used.		
		Cords.	Average value per cord.	Total value of raw material.
Georgia	4	8,925	$2.65	$23,643
North Carolina	5	4,624	2.46	11,387
South Carolina	4	1,970	1.74	3,425
All others	2	1,450	3.00	4,350
Total	15	16,969	....	42,805

TABLE 69.—*Pine distillation.*

State.	Products.			
	Charcoal.	Tar.	Oil.	Turpentine.
	Bushels.[a]	*Gallons.*	*Gallons.*	*Gallons.*
Georgia	70,000	130,000	259,000	98,750
North Carolina	102,356	105,000	113,780	66,280
South Carolina	76,000	55,000	62,000,	51,400
All others	51,750	72,500	....	21,750
Total	300,106	362,500	434,780	238,180

[a] Bushel equivalent to 20 pounds.

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